
**CANCER INCIDENCE AND MORTALITY
IN MASSACHUSETTS
1997-2001:
STATEWIDE REPORT**

Center for Health Information, Statistics,
Research and Evaluation

Massachusetts Department of Public Health

April 2004

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EXECUTIVE SUMMARY

Cancer Incidence and Mortality in Massachusetts, 1997-2001: Statewide Report presents cancer incidence and mortality data for the Commonwealth from 1997 through 2001. The data include numbers and rates for twenty-three types of cancer, detailed information about the most commonly occurring types of cancer, a comparison of Massachusetts and national cancer rates, and a discussion of cancer trends. The report contains only invasive cancers (except urinary bladder which includes both, invasive and *in situ* cases). This corresponds to the National Cancer Institute's Surveillance, Epidemiology and End Results (SEER) program cancer classification. The trend data were analyzed with the estimated annual percent change (EAPC), a measure used by the SEER program to examine trends over time.

Highlights from the report

- From 1997 to 2001 there were 168,088 newly diagnosed cases of cancer and 69,244 deaths from cancer among Massachusetts residents. The average annual age-adjusted incidence rate was 517.1 per 100,000 persons, and the average annual age-adjusted mortality rate was 209.6 per 100,000 persons. Overall, cancer incidence and mortality rates in Massachusetts remained stable. (The decrease was less than 0.5% per year and not statistically significant for incidence and mortality rates).
- Prostate cancer was the most common type of newly diagnosed cancer among Massachusetts males. Prostate cancer accounted for 30% of new cancers among males in the state from 1997 to 2001. The average annual age-adjusted incidence rate of prostate cancer was 185.4 per 100,000 males. The incidence rate of prostate cancer in Massachusetts increased by 1.1% per year from 1997 to 2001; though the increase was not statistically significant.
- From 1997 to 2001, breast cancer was the most common type of newly diagnosed cancer among Massachusetts females, accounting for about 31% of new cancers among females in the state. The average annual age-adjusted incidence rate of breast cancer was 145.6 per 100,000 females. The incidence rate of female breast cancer decreased. However, the decrease may look more favorable than it really is because annual rates fluctuated over the years 1997-2001.
- Cancer of the bronchus and lung was the most common cause of cancer deaths among both Massachusetts males and females between 1997 and 2001, accounting for 29% of all deaths among males and 24% of all deaths among females. During this time period, the mortality rate of cancer of the bronchus and lung in Massachusetts decreased by 2.4% annually for males and did not change for females. The decrease was statistically significant for males.
- For all types of cancer combined for 1997-2001, black, non-Hispanics had the highest age-adjusted incidence and mortality rate among Massachusetts males. Between 1997 and 2001, cancers of the prostate, bronchus and lung, and colon/rectum were the top three most commonly diagnosed cancers, and cancer of the bronchus and lung was the most common cause of cancer death for all Massachusetts male race/ethnicity categories.

- For all types of cancer combined for 1997-2001, white, non-Hispanics had the highest age-adjusted incidence rate, and black, non-Hispanics had the highest age-adjusted mortality rate among Massachusetts females. Cancers of the breast, bronchus and lung, and colon/rectum were the top three most commonly diagnosed cancers for all Massachusetts female race/ethnicity categories during this time period. Cancer of the bronchus and lung was the most common cause of cancer death among all female race/ethnicities in Massachusetts, except Hispanic females. Breast cancer was the leading cause of death for Hispanic females.
- The age-adjusted incidence and mortality rates in Massachusetts were higher than their national counterparts. The Massachusetts incidence rate from 1997 to 2001 was 517.1 per 100,000, while the rate for the SEER areas was 472.3 per 100,000 from 1996 to 2000. Similarly, the age-adjusted mortality rate in Massachusetts was higher than the age-adjusted mortality rate in the United States for all cancer sites combined, 209.6 per 100,000 vs. 202.3 per 100,000, respectively. Cancer incidence and mortality rates for all sites combined stabilized from 1998 to 2000 in Massachusetts and nationally.
- From 1997 to 2001, there were statistically significant decreases in the age-adjusted incidence rates for cancers of the bronchus and lung, larynx, leukemia, pancreas for Massachusetts males, and of cancer of the cervix uteri for Massachusetts females. During this time period, there were statistically significant increases in the age-adjusted incidence rates for melanoma and cancer of the thyroid for Massachusetts females.
- Age-adjusted mortality rates for cancer of the bronchus and lung for Massachusetts males and cancers of the breast and colon/rectum for Massachusetts females decreased significantly in 1997-2001.

INTRODUCTION

The Massachusetts Cancer Registry (MCR) collects reports of newly diagnosed cases of cancer and routinely compiles summaries of cancer incidence and mortality data. This report, *Cancer Incidence and Mortality in Massachusetts, 1997-2001: Statewide Report*, is produced annually with statewide data. An electronic version of this report may be found on the Internet at <http://www.state.ma.us/dph/bhsre/mcr/canreg.htm#statewide>. Another report, the *Cancer Incidence in Massachusetts: City and Town Supplement*, is also produced annually and contains information for the 351 cities and towns in Massachusetts. The most recent *City and Town Supplement* may be found on the Internet at <http://www.state.ma.us/dph/bhsre/mcr/canreg.htm#supplement>.

Content

This report:

- provides statewide information on cancer incidence and mortality in Massachusetts for twenty-three types of cancer and for all cancers combined for 1997 through 2001, including data by race/ethnicity;*
- provides detailed information about the most commonly occurring types of cancer for 1997 through 2001, including leading cancers by race/ethnicity;
- compares Massachusetts incidence and mortality data with national incidence and mortality data;
- reviews Massachusetts cancer incidence and mortality trends for 1997 through 2001.

The report is organized into the following four sections:

- **METHODS** provides a detailed explanation of the data collection, data processing and statistical techniques employed in this report and the limitations to consider when reviewing the data.
- **OVERVIEW** provides an overview of the leading types of cancer incidence and mortality in Massachusetts from 1997 through 2001 and trends in the state during that time period.
- **TABLES** presents cancer incidence and mortality data for twenty-three types of cancer, by sex, for 1997-2001. There are eleven tables in this section with breakdowns such as state vs. nation, race/ethnicity, year, and age group.
- **APPENDICES** provides information supplemental to this report, including a listing of codes used to prepare the report and population estimates.

** The Massachusetts incidence data presented include only invasive cancers, with the exception of cancer of urinary bladder, where both in situ and invasive cases are included.*

New in This Report

New data sources

New data sources such as dermatologist offices, and dermatopathology laboratories have been added to the existing data collection sources in the year 2001.

New urinary bladder cancer definition

Invasive and *in situ* cases of urinary bladder cancer are included in this report. This is consistent with the definition used by the National Cancer Institute's Surveillance, Epidemiology and End Results (SEER) program. Massachusetts Cancer Registry started to collect *in situ* cases of urinary bladder cancer in the year 1992. Prior to this report only invasive cases of urinary bladder cancer were presented.

ICD-O-3 implementation

The International Classification of Diseases for Oncology, Third Edition (ICD-O-3) was implemented in North America with cases diagnosed as of January 1, 2001. Cancer cases diagnosed before this date were classified according to the International Classification of Diseases for Oncology, Second Edition (ICD-O-2). With the advance of diagnostic techniques over the past decade, the International Agency for Research on Cancer (IARC) and the cancer division of the World Health Organization (WHO) found it necessary to revise and update the International Classification of Diseases for Oncology, Second Edition (ICD-O-2). As a result, the new edition (ICD-O-3) contains more specific information about certain cancers. The most important changes between the second and the third editions include:

- Certain hematopoietic diseases are now considered to be malignant, where previously they were classified as uncertain whether benign or malignant.
- Some neoplasms (mainly ovarian tumors) previously coded as malignant now revert to uncertain whether benign or malignant.

All cancer cases in Massachusetts Cancer Registry database diagnosed prior to January 1, 2001, coded in ICD-O-2 edition were converted to ICD-O-3 edition, following SEER rules of conversion.

Any comparison of annual incidence rates between the year 2000 and 2001(or comparison of the rates presented in this report with the previous one) should take into the account the changes described above.

METHODS

Data Sources

Cancer Incidence

Massachusetts cancer incidence data are collected by the Massachusetts Cancer Registry (MCR). The MCR is a population-based cancer registry that was established by state law in 1980 and began collecting data in January, 1982. The MCR collects reports of newly diagnosed cancer cases from all Massachusetts acute care hospitals and one medical practice association (76 reporting facilities). In the year 2001, MCR started to collect reports from dermatologist offices (230 offices) and dermatopathology laboratories (2 laboratories). Currently, the MCR collects information on *in situ* and invasive cancers and benign tumors of the brain and associated tissues. MCR does not collect the information on basal and squamous cell carcinomas of the skin.

During the time period from 1997 to 2000, case reports were coded following the International Classification of Diseases for Oncology, Second Edition (ICD-O-2) system (1). The International Classification of Diseases for Oncology, Third Edition (ICD-O-3) was implemented in North America with cases diagnosed as of January 1, 2001, and after (2). For comparability of the data, all cancer cases diagnosed prior to January 1, 2001, coded in ICD-O-2 were converted to ICD-O-3, following SEER rules of conversion (3). ICD-O-3 implementation led to some changes in cancer site definitions (Appendix I).

The activities of the MCR involve data collection efforts in collaboration with hospital tumor registrars. Intensive data evaluation is also required to ensure data quality. The fundamental requirements of any central cancer registry include: a) complete registration; b) prevention of duplication; c) collection of uniform data (i.e., standardization of items, definitions, rules, classification and nomenclature of primary site, histology, staging and procedures; d) quality control; and e) efficient data processing.

The MCR also collects information from reporting hospitals on cases diagnosed and treated in staff physician offices when this information is available. Not all hospitals report this type of case, however, and some hospitals report such cases as if the patients had been diagnosed and treated by the hospital directly. Collecting this type of data makes the MCR's overall case ascertainment more complete. The cancer types most often reported to the MCR in this manner are prostate cancer and melanoma.

This MCR report identifies previously unreported cancer cases through death certificate clearance to further improve case completeness. This process identifies cancers mentioned on death certificates that were not previously reported to the MCR. In some instances, the MCR obtains additional information on these cases through follow-up activities with hospitals, nursing homes and physicians' offices. In other instances, a cancer-related cause of death recorded on a Massachusetts death certificate is the only source of information for a cancer case. These "death certificate only" cancer diagnoses are, therefore, poorly documented, and have not been confirmed by review of complete clinical information. Such cases are included in this report, but they comprise less than 3% of all cancer cases for these years.

Each year, the North American Association of Central Cancer Registries (NAACCR) reviews cancer registry data for quality, completeness, and timeliness. For diagnosis years 1997-1999, the MCR's annual case count was estimated by NAACCR to be 99.8% complete. Using NAACCR methodology, the MCR estimates its case completeness for the year 2000 to be 99.3%. Completeness for the year 2001 has not yet been estimated. The NAACCR method requires comparison with national incidence and mortality data, which are not yet available for the year 2001.

The Massachusetts data summarized in this report were drawn from cancer cases entered on MCR computer files before October 1, 2003 and from death certificate clearance activities completed in September 2003. The numbers presented in this report may change slightly in future reports, reflecting late reported cases or corrections based on subsequent details from the reporting facilities. Such changes might result in slight differences in numbers and rates in future reports of MCR data, reflecting the nature of population-based cancer registries that receive case reports on an ongoing basis.

Massachusetts cancer cases presented in this report are primary cases of cancer diagnosed among Massachusetts residents during 1997-2001. Cancer site/types were grouped according to coding definitions adapted from the National Cancer Institute's Surveillance, Epidemiology, and End Results (SEER) program (Appendix I). The Massachusetts data presented include invasive cancers only (except cancer of urinary bladder where *in situ* cancers are also included). Invasive cancers have spread beyond the layer of cells where they started and have the potential to spread to other parts of the body. *In situ* cancers are neoplasms diagnosed at the earliest stage, before they have spread, when they are limited to a small number of cells and have not invaded the organ itself. Typically, published incidence rates do not combine invasive and *in situ* cancers due to differences in the biologic significance, survival prognosis and types of treatment of the tumors. Cancer of the urinary bladder is the only exception, due to the specific nature of the diagnostic technique and treatment patterns.

The national incidence data are from the National Cancer Institute's Surveillance, Epidemiology, and End Results (SEER) program. The SEER incidence data presented here were obtained from the SEER 1975-2000 public-use data (4) and include cancer cases from 12 SEER areas covering about 14% of the United States population. Data from the other SEER registries that only recently began participating in the SEER program are not included. At the time of publication, the year 2000 was the latest diagnosis year available for public use. As a result, the SEER incidence rates cover the time period 1996-2000.

Cancer Mortality

Massachusetts death data are obtained from the Massachusetts Registry of Vital Records and Statistics, which has legal responsibility for collecting reports of deaths in this state. Death reports from 1997 and 1998 were coded using the International Classification of Diseases, Ninth Revision (ICD-9) (5). Death reports from 1999 to 2001 were coded using the International Classification of Diseases, Tenth Revision (ICD-10) (6). The cancer site/type groups for deaths in this report were based on cancer site/type grouping from the SEER program. Some causes of death previously classified as not cancer related deaths were added to an appropriate malignant category in the year 2001 for consistency between incidence and mortality reports (Appendix I).

The national U.S. mortality data presented here were obtained from the SEER 1975-2000 public-use data (4). Massachusetts data presented here were compared with the national data published by the SEER program for consistency of the comparison between *incidence* and *mortality*. At the time of publication, 2000 was the latest year for which mortality data were available from SEER. As a result, the U.S. mortality rates cover the time period 1996-2000.

The cancer mortality data published in this report may slightly differ from the cancer mortality data published in *Massachusetts Deaths*, the annual Massachusetts Department of Public Health mortality surveillance publication. *Massachusetts Deaths* uses comparability modified rates consistent with the NCHS. To help make comparisons between deaths coded with ICD-9 and ICD-10, the National Center for Health Statistics (NCHS) has developed preliminary comparability ratios for leading causes of death. These comparability ratios are multipliers that adjust for changes in coding between the two revisions of ICD (7). Massachusetts mortality data were *not* adjusted with the comparability ratios, following the SEER rules for cancer mortality site/type codification.

Definitions

Age-Specific Rates

Massachusetts statewide age-specific rates were calculated by dividing the number of people in an age group who were diagnosed with cancer or died of cancer in a given time frame by the number of people in that same age group overall in a given time frame. They are presented as rates per 100,000 residents.

Age-Adjusted Rates

Massachusetts statewide incidence and mortality rates are sex-specific, age-adjusted rates per 100,000 population, and were calculated by the direct method using the 2000 U.S. Bureau of the Census population distribution as the standard. Rates were age-adjusted using 18 five-year age groups to correct for differences in the age distributions of different populations. Age-adjusted rates can only be compared if they are adjusted to the same standard population. Age-adjusted cancer incidence and mortality rates presented in this report differ from those in previous reports which used a different standard such as the 1970 U.S. population. It is also important to note that differences in methodologies used in calculating rates, such as number of age groups used, may cause slight variations in results.

Estimated Annual Percent Change (EAPC)

The estimated annual percent change (EAPC) is a statistical method for trend analysis. It shows how fast or slow a cancer rate has increased or decreased over the observed period of time. This estimation assumes that the change in incidence or mortality rates is constant during the observed time period. The EAPC was calculated using the same methods as the SEER program uses, $EAPC = 100 * (e^m - 1)$, where m is a slope of the linear regression line, approximation of the function of the natural logarithm of the rates by the year of diagnosis (4).

A positive EAPC corresponds to an increasing trend, while a negative EAPC corresponds to a decreasing trend. All of the EAPCs calculated in this report were tested against the hypothesis that they are equal to zero (the rate is neither increasing nor decreasing). A p value is a statistical term that indicates the probability that a result is due to chance alone. In this report, a p value ≤ 0.05 was used to determine statistical significance. Here, a p value ≤ 0.05 means that there is, at most, a 5% chance that the positive or negative EAPC is due to chance alone.

Population Estimates

For the computation of Massachusetts incidence and mortality rates in this report, the statewide populations for years 1997 and 1998 were based on population estimates released by the Massachusetts Institute for Social and Economic Research (MISER) in September, 2000. The 1999 and 2000 population estimates are from the Massachusetts Department of Public Health (MDPH) (8). In order to create a 1999 MDPH population file, MDPH applied a linear interpolation between the 1998 MISER population estimates and the MDPH 2000 population estimates. This MDPH 1999 file should be considered a preliminary estimate, and may change in the future. The MDPH 2000 population file is based upon the Massachusetts Census file, which contains data on population and housing for the 351 cities and towns, the state, and the counties for Massachusetts abstracted from the *Census 2000 SF1* file (U.S. Census, 2001). Census data were reallocated to create mutually exclusive race categories consistent with the race categories used to collect cancer incidence and cancer mortality data. The preliminary MDPH 2001 population file was the same as MDPH 2000 population file at the time of publication of this report. Massachusetts population estimates for 1997-2001, which are used in this report, are presented in Appendix II. If different population estimates were used to calculate rates in other reports, the rates may vary.

Race/Ethnicity Definitions

The race/ethnicity categories presented in this report are mutually exclusive. Cases and deaths are only included in one race/ethnicity category. The race/ethnicity tables include the categories white, non-Hispanic; black, non-Hispanic; Asian, non-Hispanic; and Hispanic. The total population in Massachusetts includes unknown race/ethnicity category and the number of cases for total population is not the sum of cases by race/ethnicity.

Interpreting the data

In interpreting cancer incidence and mortality data in this report, it is important to consider the following:

Border Areas and Neighboring States

Some areas of Massachusetts appear to have low cancer incidence, but this may be due to loss of cases in Massachusetts residents who were diagnosed in neighboring states and not reported to the MCR. Presently the MCR has reciprocal reporting agreements with the following fifteen states: Alaska, Arkansas, Connecticut, Florida, Maine, Mississippi, New Hampshire, New York, North Carolina, Rhode Island, South Carolina, Texas, Vermont, Wisconsin and Wyoming.

Cases Diagnosed in Non-Hospital Settings

During the time period covered by this report, the MCR's information sources for most newly diagnosed cases of cancer were hospitals. In addition, the MCR collected information from reporting hospitals on cases diagnosed and treated in staff physician offices, when this information was available. In 2001, dermatologists and dermatopathology laboratories reporting sources were added. The addition of new reporting sources may elevate the incidence of melanoma diagnosed in the year 2001. Some types of cancer in this report may be under-reported because they are diagnosed primarily by private physicians, private laboratories, health maintenance organizations or radiotherapy centers that escape the case identification systems used by hospitals. The extent of this under-reporting has not been determined exactly, but cases included in this report represent the great majority of cases statewide and provide an essential basis for evaluating statewide cancer incidence patterns.

Cancer Sites Definition

Note: including in situ cases in urinary bladder cancer incidence has elevated both the number of cases and rates for this site and for all sites combined compared to the previous reports.

The implementation of ICD-O-3 coding, and corresponding cancer site recodes, has changed the incidence of some types of tumors, especially ovarian cancer, leukemias and lymphomas. Some ovarian tumors became coded 'uncertain' instead of 'malignant', and are, therefore, no longer reportable to the MCR. Conversely, certain blood diseases (refractory anemia, for instance) that were not collected prior to January 1, 2001, became reportable as malignant neoplasms (3). These changes may affect annual site-specific incidence, causing a drop or spike in 2001 rates, as well as the incidence of all sites combined and average annual incidence rates. The impact of the changes is not believed to be substantial (5,000 to 10,000 new cases in the U.S. per year, representing less than one percent of the approximately 1.3 million new cancer cases diagnosed annually in the United States) (4), but caution should be exercised when comparing rates in 2001 with those for previous years, as well as when comparing this report with the previous ones.

Trends

Trend data should be interpreted with caution. Apparent increases or decreases in cancer incidence over time may reflect changes in diagnostic methods or case reporting rather than true changes in cancer occurrence. Also, cancer incidence trends may appear more favorable than they actually are because they have not been adjusted for reporting error or delay (9). Typically, statewide Massachusetts cancer incidence data are released about two years after a diagnosis year; for example, data for 2001 diagnoses are released for the first time in 2004. The MCR continues to receive case reports on an ongoing basis even after the data are released. The delayed case reports, as well as corrections to cases based on subsequent details from the reporting facilities, result in reporting delay and error; the more recent diagnosis years may be less complete than the earlier diagnosis years. Finally, the following should be considered when interpreting trend data:

- The source of the population estimates differs between 1996-1998 and 1999-2001.
- The EAPC assumes that the change in rate is the same over the entire time period examined, which may or may not be true for the trends examined in this report.
- If the percent of difference in rates between year 2001 and year 1997 is small, the statistical significance of EAPC may have no practical importance.

Race/Ethnicity

Race/ethnicity data for cancer cases are based on information in the medical record.

Race/ethnicity data for cancer deaths are based on information from death certificates as reported by next-of-kin and funeral directors. Errors in these source documents may lead to incorrect classification of race/ethnicity. Also, completeness of the race/ethnicity data may be different for cancer cases and cancer deaths. Some race/ethnicity categories may be under-reported if race/ethnicity is not available for all cases. Counts and rates may under-represent the true incidence of cancer in some racial/ethnic populations.

OVERVIEW

Leading Types of Cancer Incidence and Mortality

Cancer Incidence by Sex

In Massachusetts, from 1997 through 2001, there were 168,088¹ newly diagnosed cases of cancer – 84,589 in males and 83,482 in females (Table 3).

For all types of cancer combined for 1997-2001, the average annual age-adjusted incidence rate among males was 614.2 cases per 100,000 (Table 4). The most commonly diagnosed type of cancer in Massachusetts males for this time period was prostate cancer, followed by cancers of the bronchus and lung, colon/rectum and urinary bladder (Figure 1). There were 25,637 cases of prostate cancer reported from 1997-2001, accounting for 30.3% of all cancers diagnosed in Massachusetts males and an age-adjusted incidence rate of 185.4 cases per 100,000 (Tables 3 and 4).

For all types of cancer combined for 1997-2001, the average annual age-adjusted incidence rate among females was 455.0 cases per 100,000 (Table 4). Among Massachusetts females, the most commonly diagnosed cancer types were cancers of the breast, bronchus and lung, colon/rectum, and corpus uteri (uterus) (Figure 1). There were 25,799 cases of breast cancer reported from 1997-2001, accounting for 30.9% of all cancers diagnosed in females and an age-adjusted incidence rate of 145.6 cases per 100,000 (Tables 3 and 4).

In both sexes, the four leading types of cancer comprised approximately 62-64% of all new cancer cases for this time period (Figure 1). No other type of cancer constituted more than 5% of new cases in either sex (Table 3).

From 1997-2001, the age-specific incidence rate for all cancer sites combined increased with age, peaked among those 75-84 years old, and then declined in those 85 years old and older for both Massachusetts males and females (Table 8).

Cancer Incidence by Sex and Race/Ethnicity

For all types of cancer combined for 1997-2001, black, non-Hispanics had the highest age-adjusted incidence rate among Massachusetts males (726.8 cases per 100,000) (Table 6). The top three most commonly diagnosed cancers were the same for all Massachusetts male race/ethnicity categories. These top three cancers included prostate cancer, followed by cancers of the bronchus and lung and colon/rectum. The cancer that ranked fourth for Massachusetts males varied by race/ethnicity. The fourth most commonly diagnosed cancer was cancer of the urinary bladder for white, non-Hispanic males, stomach cancer for black, non-Hispanic males, cancer of the liver and

¹ The male and female case counts will not add up to the total case count because the MCR added two additional gender classifications (transsexuals and persons with sex chromosome abnormalities/hermaphrodites) for cases diagnosed as of January 1, 1995. Cases diagnosed before this date were limited to male or female only.

intrahepatic bile ducts for Asian, non-Hispanic males, and cancer of the urinary bladder for Hispanic males (Table 1).

For all types of cancer combined in 1997-2001, white, non-Hispanics had the highest age-adjusted incidence rate among Massachusetts females (455.2 cases per 100,000) (Table 6). Breast cancer was the most commonly diagnosed cancer for all race/ethnicities. Cancer of the bronchus and lung was the second leading cancer for white, non-Hispanic and black, non-Hispanic females, but the third leading cancer for Asian, non-Hispanic and Hispanic females. Cancer of the colon/rectum was the third leading cancer for white, non-Hispanic and black, non-Hispanic females, but the second leading cancer for Asian, non-Hispanic and Hispanic females. Corpus uteri cancer was the fourth leading cancer site for all race/ethnicity groups, except Asian, non-Hispanic females. Thyroid cancer was the fourth most common cancer for this group (Table 1).

Cancer Mortality by Sex

Although prostate cancer and breast cancer were the most commonly diagnosed cancers in Massachusetts males and females, respectively, these cancers ranked second in mortality for each sex. Cancer of the bronchus and lung was the leading cause of cancer death for both males and females between 1997 and 2001 (Figure 2). During this time period, cancer of the bronchus and lung accounted for 28.9% of all cancer deaths and an age-adjusted mortality rate of 74.1 per 100,000 in males and 24.2% of all cancer deaths and an age-adjusted mortality rate of 44.1 per 100,000 in females (Tables 9 and 10). The third and fourth most common types of cancer death in Massachusetts males and females for 1997-2001 were cancers of the colon/rectum and pancreas (Figure 2).

In both sexes, the four leading types of cancer comprised approximately 56% of all cancer deaths for this time period (Figure 2). No other type of cancer constituted more than 5% of cancer deaths in either sex (Table 9).

Cancer Mortality by Sex and Race/Ethnicity

For all types of cancer combined for 1997-2001, black, non-Hispanics had the highest age-adjusted mortality rate among males, with 357.1 deaths per 100,000 males (Table 12). For Massachusetts males, cancer of the bronchus and lung was the most common cause of cancer death among all race/ethnicities. Cancer of the prostate was the second leading cause of cancer death among white, non-Hispanic, black, non-Hispanic, and Hispanic males. Cancer of the colon/rectum was the third most common cause of cancer death among white, non-Hispanic, black, non-Hispanic, and Hispanic males. Cancer of the liver and intrahepatic bile ducts ranked the second leading cause of cancer death for Asian, non-Hispanic males, and cancer of stomach ranked the third among this group (Table 2).

For all types of cancer combined for 1997-2001, black, non-Hispanic females had the highest age-adjusted mortality rate among females with 202.9 deaths per 100,000 females (Table 12). Cancer of the bronchus and lung was the most common cause of cancer death among all female race/ethnicities, except Hispanic females. Breast cancer was the leading cause of death for Hispanic females. Cancers of the breast and colon/rectum were the second and third leading causes of cancer death, respectively, among white, non-Hispanic and black, non-Hispanic

women. For Asian, non-Hispanic women breast cancer ranked third after cancer of the colon/rectum. The second and third leading causes of cancer death for Hispanic females were cancers of the bronchus and lung and colon/rectum, respectively (Table 2).

Figure 1
DISTRIBUTION OF CANCER INCIDENCE BY CANCER TYPE AND SEX
Massachusetts, 1997-2001

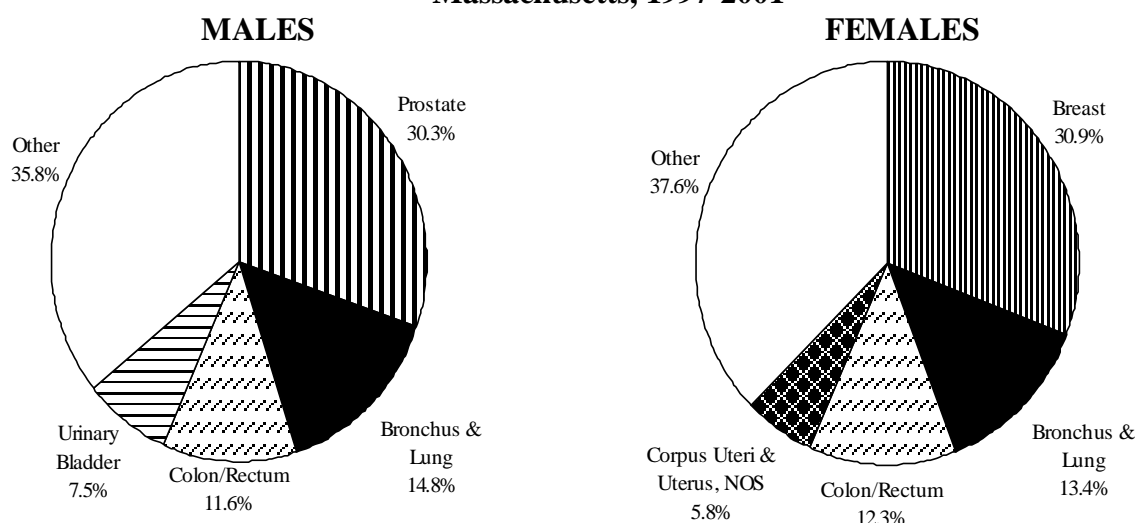


Table 1
LEADING CANCERS BY SEX AND RACE/ETHNICITY
Massachusetts, 1997-2001

M A L E S

RANK	AGE-ADJUSTED ¹ INCIDENCE RATE ² (% OF ALL CASES)			
	White, non-Hispanic	Black, non-Hispanic	Asian, non-Hispanic	Hispanic
1	Prostate 178.9 (29.8%)	Prostate 316.8 (42.0%)	Prostate 80.8 (20.2%)	Prostate 166.1 (29.2%)
2	Bronchus & Lung 91.5 (15.1%)	Bronchus & Lung 103.5 (13.8%)	Bronchus & Lung 53.5 (14.0%)	Bronchus & Lung 58.7 (10.4%)
3	Colon/Rectum 72.7 (11.8%)	Colon/Rectum 71.6 (9.2%)	Colon/Rectum 45.7 (12.6%)	Colon/Rectum 47.9 (8.9%)
4	Urinary Bladder 48.2 (7.8%)	Stomach 22.4 (2.9%)	Liver & Intrahepatic Bile Ducts 28.6 (10.0%)	Urinary Bladder 25.6 (4.2%)

F E M A L E S

RANK	AGE-ADJUSTED ¹ INCIDENCE RATE ² (% OF ALL CASES)			
	White, non-Hispanic	Black, non-Hispanic	Asian, non-Hispanic	Hispanic
1	Breast 147.4 (31.1%)	Breast 108.9 (29.2%)	Breast 64.6 (26.9%)	Breast 92.1 (28.6%)
2	Bronchus & Lung 61.4 (13.7%)	Bronchus & Lung 50.3 (12.4%)	Colon/Rectum 40.0 (12.1%)	Colon/Rectum 35.7 (9.4%)
3	Colon/Rectum 51.5 (12.4%)	Colon/Rectum 47.8 (11.7%)	Bronchus & Lung 29.1 (9.2%)	Bronchus & Lung 24.6 (6.3%)
4	Corpus Uteri & Uterus, NOS 27.7 (5.8%)	Corpus Uteri & Uterus, NOS 20.8 (5.2%)	Thyroid 13.9 (7.1%)	Corpus Uteri & Uterus, NOS 22.8 (6.8%)

¹ Age-adjusted to the 2000 U.S. Standard Population ² per 100,000

Figure 2
DISTRIBUTION OF CANCER MORTALITY BY CANCER TYPE AND SEX
Massachusetts, 1997-2001

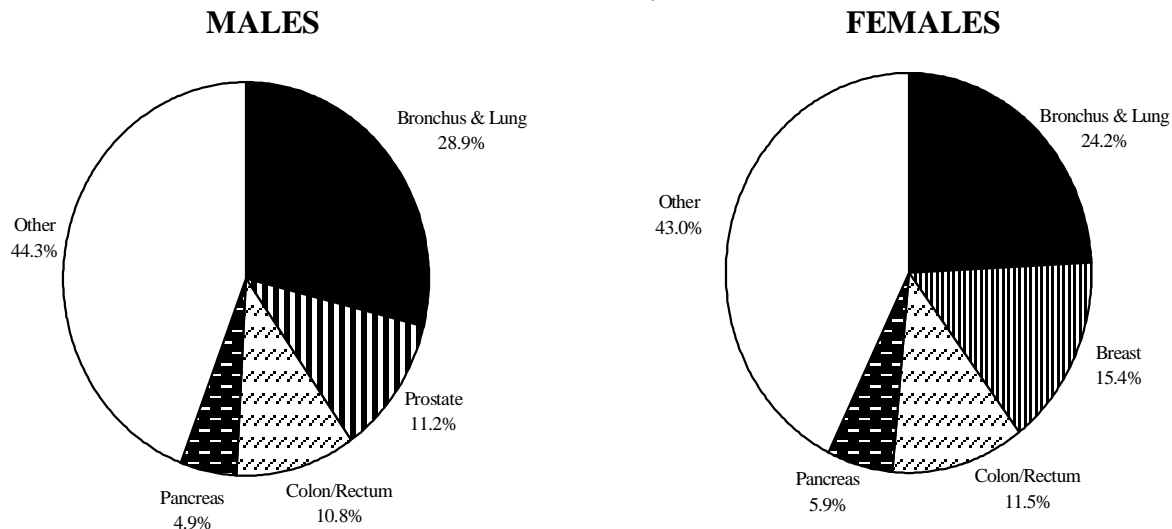


Table 2
LEADING CANCER DEATHS BY SEX AND RACE/ETHNICITY
Massachusetts, 1997-2001

M A L E S

RANK	AGE-ADJUSTED ¹ MORTALITY RATE ² (% OF ALL CASES)			
	White, non-Hispanic	Black, non-Hispanic	Asian, non-Hispanic	Hispanic
1	Bronchus & Lung 74.9 (29.1%)	Bronchus & Lung 99.5 (28.8%)	Bronchus & Lung 36.9 (25.1%)	Bronchus & Lung 30.7 (20.7%)
2	Prostate 31.6 (11.2%)	Prostate 64.4 (14.5%)	Liver & Intrahepatic Bile Ducts 19.9 (17.5%)	Prostate 21.8 (10.4%)
3	Colon/Rectum 28.8 (10.8%)	Colon/Rectum 38.3 (10.4%)	Stomach 11.5 (6.5%)	Colon/Rectum 14.8 (9.5%)
4	Pancreas 12.7 (4.9%)	Pancreas 19.5 (5.8%)	Colon/Rectum 10.6 (8.6%)	Liver & Intrahepatic Bile Ducts 10.2 (7.7%)

F E M A L E S

RANK	AGE-ADJUSTED ¹ MORTALITY RATE ² (% OF ALL CASES)			
	White, non-Hispanic	Black, non-Hispanic	Asian, non-Hispanic	Hispanic
1	Bronchus & Lung 45.4 (24.6%)	Bronchus & Lung 39.9 (19.5%)	Bronchus & Lung 23.3 (18.7%)	Breast 12.5 (16.3%)
2	Breast 28.5 (15.4%)	Breast 32.3 (16.6%)	Colon/Rectum 15.3 (12.3%)	Bronchus & Lung 11.9 (12.1%)
3	Colon/Rectum 19.1 (11.6%)	Colon/Rectum 24.3 (11.6%)	Breast 14.0 (14.1%)	Colon/Rectum 9.9 (10.6%)
4	Pancreas 10.2 (6.0%)	Pancreas 13.4 (6.5%)	Liver & Intrahepatic Bile Ducts 8.2 (7.1%)	Non-Hodgkin('s) Lymphoma 4.8 (6.2%)

¹ Age-adjusted to the 2000 U.S. Standard Population ² per 100,000

Massachusetts Incidence and Mortality Compared to the U.S.

Age-adjusted incidence and mortality rates in Massachusetts are compared to national rates in Table 4 (incidence) and Table 10 (mortality). It is important to interpret these data cautiously. The United States incidence data are from selected registries participating in the SEER program, which covers a small percentage (14%) of the United States population. In general, the SEER program over-represents urban areas and foreign-born people compared to the United States population as a whole. Cancer rates may be affected by such characteristics of the population, as well as by differences in the racial/ethnic composition of the population, the prevalence of cancer risk factors, and cancer screening rates. Cancer rates in Massachusetts and the SEER areas may differ because of these variations.

Also, the Massachusetts incidence and mortality data presented in these tables represent cancer cases and deaths from 1997-2001. The SEER incidence and the United States mortality data represent cancer cases and deaths from 1996-2000 (the latest available data from the SEER program). Thus, the time period differs between Massachusetts and the national comparison. Additionally, the Massachusetts cancer sites are grouped according to ICD-O-3 Classification system while the SEER incidence data are coded by ICD-O-2 Classification. The reason for the difference in coding systems is the difference in the reporting time period. As noted in the Methods section, ICD-O-3 was implemented in the year 2001. Rates of ovarian, blood cancers may be affected by these changes (3).

However, the patterns of national and state incidence and mortality rates may still be compared. For all cancer sites combined and both sexes, the age-adjusted incidence rate was higher in Massachusetts than the SEER areas. The Massachusetts incidence rate from 1997 to 2001 was 517.1 per 100,000, while the rate for the SEER areas was 472.3 per 100,000 from 1996-2000 (Table 4). The incidence rates in Massachusetts were also higher than the incidence rates in the SEER areas for leading cancers such as cancer of the bronchus and lung, colon/rectum, female breast, and prostate. Incidence rates in Massachusetts were lower than the incidence rates in the SEER areas for cancer types such as cancer of the liver and intrahepatic bile ducts and cervix uteri, however (Table 4).

Similarly, the age-adjusted mortality rate in Massachusetts was higher than the age-adjusted mortality rate in the United States for all cancer sites combined, 209.6 per 100,000 vs. 202.3 per 100,000, respectively (Table 10). Massachusetts had a higher mortality rate than the United States for cancers such as bronchus and lung among females. Massachusetts had a lower rate than the United States for some other cancers such as bronchus and lung among males and cervix uteri among females (Table 10).

Cancer Incidence and Mortality Trends

Incidence

From 1997 to 2001, overall cancer incidence in Massachusetts decreased by 0.2% per year; (0.3% per year in males and 0.4% per year in females). However, these trends were not statistically significant. Incidence trends in the leading cancers affecting Massachusetts men and women are discussed below. See Figures 3 and 4 and Table 3 for incidence and mortality trends and Table 7 for the age-adjusted incidence rates by year. All of the data describing percent increases and decreases per year are based upon the estimated annual percent change (EAPC). Additional new sources of data collection, such as dermatologist's offices and dermatopathology laboratories, the inclusion of *in situ* cases in incidence of urinary bladder, and the implementation of the ICD-O-3 coding system in 2001 may affect the EAPC for melanoma, urinary bladder, leukemias, lymphomas, ovarian cancer.

Males

Among Massachusetts males between 1997 and 2001, the incidence rate of prostate cancer increased by 1.1% per year, although the increase was not statistically significant (Figure 3). The 1997 incidence rate of prostate cancer was 183.6 cases per 100,000 males, and the 2001 rate increased to 188.3 cases per 100,000 males (Table 7). However, there was an overall decrease in prostate cancer from its peak incidence of 217.4 per 100,000 in 1992. Devesa *et al.* attribute national increases in prostate cancer incidence during the late 1980s and early 1990s to changes in diagnostic methodology(10). Transurethral resections were performed more frequently in the 1980s than in the preceding decade, resulting in increased detection of cases which would have been undetectable by clinical means. Other diagnostic procedures (such as serum testing for prostate-specific antigen (PSA), ultrasound-guided needle biopsy, computerized axial tomography (CAT scanning) and bone scanning) also increased the number of prostate cancer diagnoses. Edwards *et al.* suggest that increased PSA screening resulted in the increase in prostate cancer incidence from 1988 to 1992 (11). Wingo *et al.* attribute the downtrends in prostate cancer since 1992 to the identification of prevalent cases through screening, and then the subsequent falling toward an equilibrium, reflecting only incident cases in the population (12). Also, there may have been decreased utilization of PSA screening tests in recent years, which might have been precipitated by recommendations by some organizations against their widespread use during the early 1990s. Clegg *et al.* used SEER data to analyze incidence trends that have been adjusted for reporting error and delay (9). They found that the incidence rate trend for prostate cancer since 1995 among white males was similar to the incidence rate trend before the introduction of PSA testing.

The age-adjusted incidence rate declined significantly (2.8% per year) (Figure 3) for cancer of the bronchus and lung, the second most commonly diagnosed cancer in males. The incidence rate for cancer of the bronchus and lung fell from 95.1 cases per 100,000 males in 1997 to 87.3 cases per 100,000 in 2001 (Table 7). Howe *et al.* attribute the decrease in lung cancer incidence in males to reduction in tobacco smoking since the 1960s (13). Edwards *et al.* explain that tobacco smoking patterns have delayed effects on lung cancer incidence and mortality rates (11). The decline is consistent with the national data from 1996 to 2000(14).

The incidence rate of colorectal cancer decreased slightly from 75.3 cases per 100,000 males in 1997 to 73.4 cases per 100,000 in 2001. The estimated annual percent change indicated a decreasing, though not statistically significant, trend of 1.6% per year for colorectal cancer among Massachusetts males (Figure 3). The latest national data show that colorectal incidence rates stabilized beginning in 1996 for men and women (14).

The incidence data for cancer of the urinary bladder presented in this report include both *in situ* and invasive tumors. Incidence rates and trends cannot be compared with those in the previous reports, which included invasive cancer only. Incidence rates decreased among Massachusetts males. In 1997, 48.7 males per 100,000 were diagnosed with cancer of the urinary bladder; by 2001, the incidence rate fell to 45.8 per 100,000 (Table 7). Among Massachusetts males, the incidence rate of cancer of the urinary bladder decreased by 1.2% per year from 1997 to 2001; however the decrease was not statistically significant (Figure 3).

In addition to a statistically significant decline in the incidence of cancer of bronchus and lung already mentioned, there were statistically significant decreases from 1997 to 2001 for cancer of the pancreas (a decrease of 3.7% per year), larynx (a decrease of 7.7% per year), and leukemia (a decrease of 2.4% per year) among Massachusetts males.

Females

Among Massachusetts females, breast cancer incidence varied slightly between 1997 and 2001. The incidence rate decreased from 144.5 cases per 100,000 females in 1997 to 139.8 cases per 100,000 in 2001 (Table 7) and by 1.3% per year, although the trend was not statistically significant (Figure 4). The annual incidence rate ranged from 139.8 to 154.2 per 100,000 over the reported period of time (Table 7). Nationally, breast cancer incidence continues to increase. Devesa *et al.* attribute most of the increase in national breast cancer incidence to the earlier detection of tumors resulting from increasing use of mammography and other screening techniques (10). Other contributing factors may include changes in diet, alcohol consumption, the long-term use of hormone replacement therapy, and certain reproductive variables (such as later age at first childbirth).

The incidence of cancers of the bronchus and lung was steady among Massachusetts females, 60.1 cases per 100,000 females in 1997 and 60.7 cases per 100,000 in 2001 (Table 7). The slight increase (0.3% per year) still may point to the fact that the prevalence of smoking in women has lagged behind that in men, reaching a peak of 55% in the cohort of women born between 1935 and 1944 (15). Consequently, the incidence of lung cancer is still increasing in women, reflecting the historical pattern of cigarette smoking.

The third most common cancer among Massachusetts females, colorectal cancer, stabilized over the years 1997 through 2001. Its incidence rate was 53.9 per 100,000 in 1997 and 53.0 per 100,000 in 2001 which is consistent with the national data between 1996 and 2000 (14).

The annual rate for uterine cancer, the fourth most common cancer among Massachusetts females, changed a little over the years 1997 to 2001, with no statistically significant decline of 1.3% per year (Table 3).

Among Massachusetts females, there were statistically significant trends from 1997 to 2001 for cancer of the cervix (a decrease of 9.1% per year), thyroid (an increase of 11.8% per year), and melanoma of skin (an increase of 8.6% per year). The new sources of reporting melanoma in the year 2001 elevated the incidence of this cancer and, consequently, the EAPC.

Mortality

Introduction of ICD-O-10 revision beginning with 1999 mortality data had affected recent mortality trends. Changes in rules for selecting underlying causes of death with ICD-O-10 resulted in a larger net allocation (0.7%) due to cancer in 1999 through 2001. These changes of rules contributed, in part, to the leveling off of overall death rates in recent years (14). See (7) for detailed explanation of ICD-O-10 revision implementation. Cancer mortality trends in Massachusetts from 1997 to 2001 are consistent with national recent trends. For all cancer sites combined, the mortality rate in Massachusetts leveled off with non significant decrease of rate 0.4% per year (Figure 3).

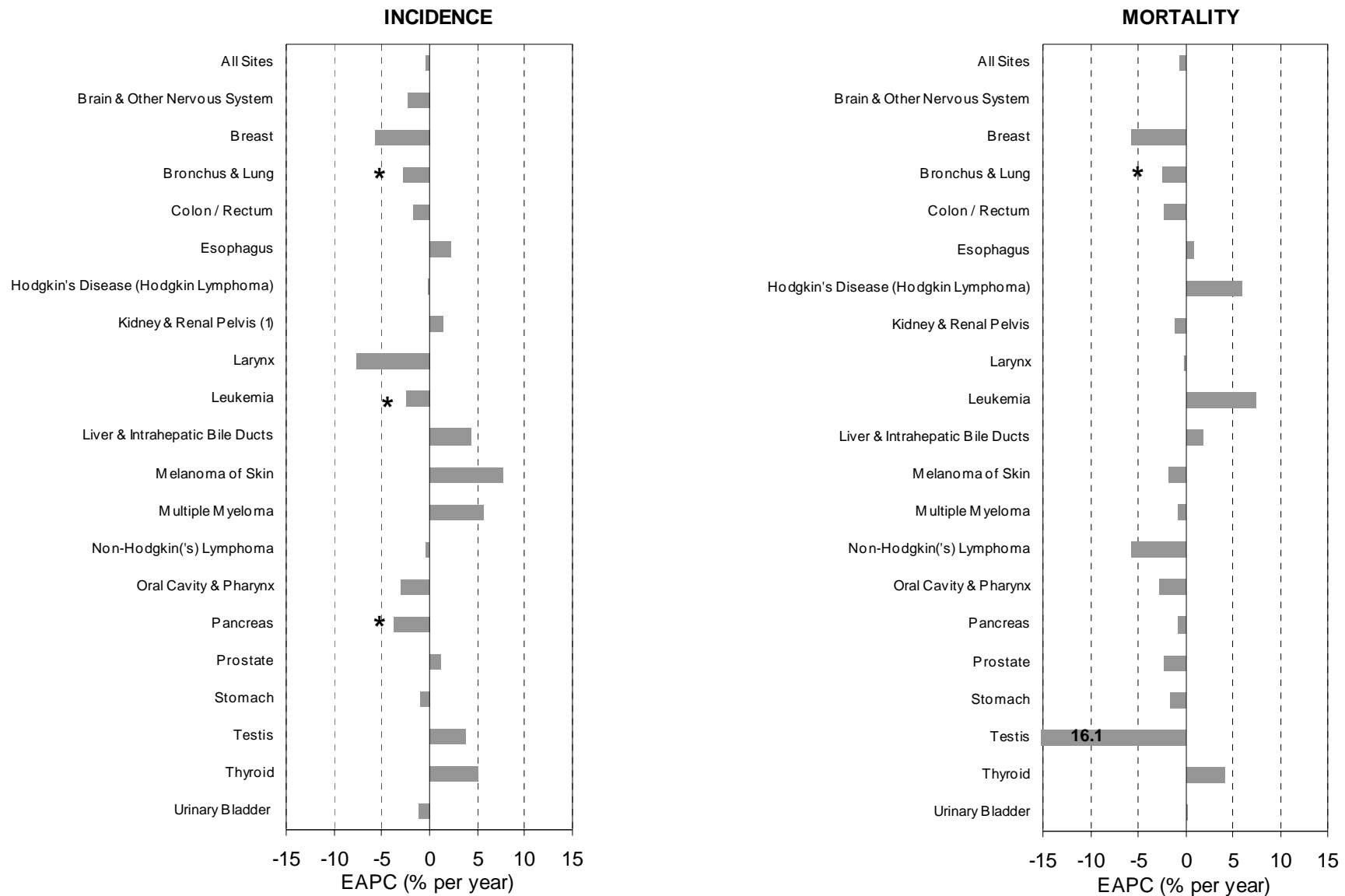
For males, statistically significant decreasing death rates have been observed both nationally and in Massachusetts for the cancer of bronchus and lung (Figure 3). The decrease in mortality of cancer of the bronchus and lung in Massachusetts males was statistically significant at 2.4% per year (Figure 3). Wingo *et al.* attribute decreasing national lung cancer mortality rates in men to decreased smoking rates over the past thirty years (15).

For Massachusetts females, lung cancer replaced breast cancer as the leading cause of cancer deaths in 1989. From 1997 to 2001, breast cancer death rates declined significantly by 3.4% per year and colon/rectum cancer death rates decreased significantly by 3.7% per year (Figure 4). Wingo *et al.* attribute the downtrend in national breast cancer mortality to the incorporation of breast cancer screening into routine medical care (12). Advances in the treatment of breast cancer have also contributed to the decline in breast cancer mortality. The mortality rate for female colon/rectal cancer continues to decline both nationally and in Massachusetts.

For Massachusetts males and females combined, the mortality rate of colorectal cancer decreased by 2.9% per year from 1997 to 2001 (Table 9) which was statistically significant. Wingo *et al.* suggest several possibilities for the decreases in both incidence and mortality of colorectal cancer, including increased polyp removal, advances in treatment protocols (e.g., new surgical techniques and adjuvant therapies), and other factors such as changes in dietary patterns (12).

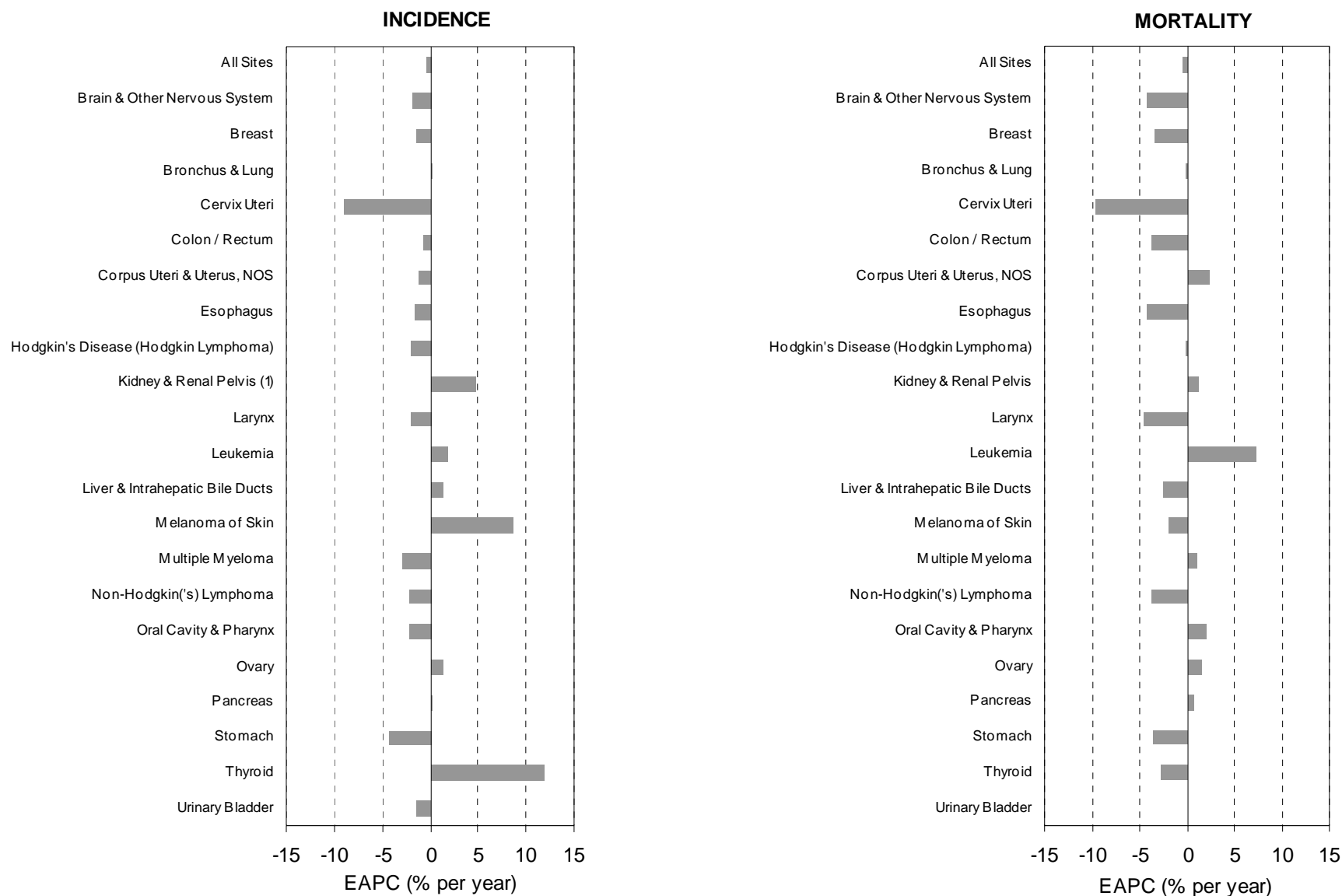
In addition to the statistically significant mortality trends already mentioned, there was a statistically significant decrease in the age-adjusted mortality rates from 1997 to 2001 for cancer of larynx. However, mortality from cancer of larynx is low for both sexes (Table 10). The difference in rates between year 2001 and year 1997 is small (Table 13), thus the statistical significance of the EAPC may have no practical importance for this site.

Figure 3
Estimated Annual Percent Change (EAPC) in Age-Adjusted Cancer Rates Among Males, Massachusetts, 1997-2001



1 Massachusetts rates for this site include codes 64.9 & 65.9 (ICD-O-3) only for comparability. Massachusetts hospital coding conventions may have assigned some cases to a "not otherwise specified" category. * EAPC is statistically significant ($p < 0.05$).

Figure 4
Estimated Annual Percent Change (EAPC) in Age-Adjusted Cancer Rates Among Females, Massachusetts, 1997-2001



1 Massachusetts rates for this site include codes 64.9 & 65.9 (ICD-O-3) only for comparability. Massachusetts hospital coding conventions may have assigned some cases to a "not otherwise specified" category. * EAPC is statistically significant ($p < 0.05$).

Estimated Annual Percent Change - Incidence 1997-2001

	Males	Females
Urinary Bladder	-1.2	-1.4
Thyroid	5.1	11.8*
Testis	3.7	-4.4
Stomach	-1.0	0.3
Prostate	1.1	1.4
Pancreas	-3.7*	-2.2
Oral Cavity & Pharynx	-2.9	-2.1
Non-Hodgkin('s) Lymphoma	-0.3	-2.8
Multiple Myeloma	5.7	8.6*
Melanoma of Skin	7.6	1.4
Liver & Intrahepatic Bile Ducts	4.5	1.8
Leukemia	-2.4*	-2.0
Larynx	-7.7*	4.8
Kidney & Renal Pelvis ⁽¹⁾	1.5	-2.0
Hodgkin's Disease (Hodgkin Lymphoma)	-0.1	-1.6
Esophagus	2.3	-1.3
Colon / Rectum	-1.6	-0.7
Bronchus & Lung	-2.8*	-9.1*
Breast	-5.7	0.3*
Brain & Other Nervous System	-2.3	-1.3
All Sites	-0.3	-1.8
	All Sites	-0.4

Estimated Annual Percent Change - Mortality 97-01

	Males	Females
Urinary Bladder	0.3	0.1
Thyroid	4.1	-2.7
Testis	-15.1	-3.5
Stomach	-1.6	0.7
Prostate	-2.2	1.6
Pancreas	-0.7	2.1
Oral Cavity & Pharynx	-2.7	-3.6
Non-Hodgkin('s) Lymphoma	-5.7	1.0
Multiple Myeloma	-0.8	-1.9
Melanoma of Skin	-1.7	-2.6
Liver & Intrahepatic Bile Ducts	1.8	7.3
Leukemia	7.5	-4.6
Larynx	0.0	1.3
Kidney & Renal Pelvis		
Hodgkin's Disease (Hodgkin	-1.1	0.0
Lymphoma)	6.0	-4.1
Esophagus	0.9	2.4
Colon / Rectum	-2.3	-3.7
Bronchus & Lung	-2.4	-9.7
Breast	-5.7	0.0
Brain & Other Nervous System	0.1	-3.4
All Sites	-0.5	-4.2
	All Sites	-0.4

TABLES

Table 3.
CANCER INCIDENCE AND INCIDENCE TRENDS BY SEX
Massachusetts, 1997-2001

<i>Cancer Site / Type</i>	<i>M a l e s</i>			<i>F e m a l e s</i>			<i>T o t a l</i>		
	<i>Number</i>	<i>Percent</i>	<i>EAPC¹</i>	<i>Number</i>	<i>Percent</i>	<i>EAPC¹</i>	<i>Number²</i>	<i>Percent</i>	<i>EAPC¹</i>
All Sites	84589	100.0	-0.3	83482	100.0	-0.4	168088	100.0	-0.2
Brain & Other Nervous System	1304	1.5	-2.3	1126	1.3	-1.8	2430	1.4	-2.0
Breast	174	0.2	-5.7	25799	30.9	-1.3	25976	15.5	-1.6
Bronchus & Lung	12518	14.8	-2.8 *	11181	13.4	0.3	23701	14.1	-1.2 *
Cervix Uteri	0	0.0	- - -	1305	1.6	-9.1 *	1305	0.8	- - -
Colon / Rectum	9820	11.6	-1.6	10238	12.3	-0.7	20060	11.9	-1.1
Corpus Uteri & Uterus, NOS	0	0.0	- - -	4866	5.8	-1.3	4867	2.9	- - -
Esophagus	1462	1.7	2.3	490	0.6	-1.6	1953	1.2	1.3
Hodgkin's Disease (Hodgkin Lymphoma)	571	0.7	-0.1	524	0.6	-2.0	1096	0.7	-1.1
Kidney & Renal Pelvis³	2478	2.9	1.5	1629	2.0	4.8	4107	2.4	3.0
Larynx	1211	1.4	-7.7 *	325	0.4	-2.0	1536	0.9	-6.7 *
Leukemia	1962	2.3	-2.4 *	1669	2.0	1.8	3631	2.2	-0.3
Liver & Intrahepatic Bile Ducts	1112	1.3	4.5	461	0.6	1.4	1573	0.9	4.1
Melanoma of Skin	3071	3.6	7.6	2528	3.0	8.6 *	5600	3.3	7.9 *
Multiple Myeloma	829	1.0	5.7	765	0.9	-2.8	1594	0.9	1.5
Non-Hodgkin('s) Lymphoma	3216	3.8	-0.3	3050	3.7	-2.1	6267	3.7	-1.1
Oral Cavity & Pharynx	2392	2.8	-2.9	1267	1.5	-2.2	3659	2.2	-2.6
Ovary	0	0.0	- - -	2600	3.1	1.4	2600	1.5	- - -
Pancreas	1810	2.1	-3.7 *	2062	2.5	0.3	3872	2.3	-1.4 *
Prostate	25637	30.3	1.1	0	0.0	- - -	25638	15.3	- - -
Stomach	1728	2.0	-1.0	1111	1.3	-4.4	2839	1.7	-2.1
Testis	969	1.1	3.7	0	0.0	- - -	970	0.6	- - -
Thyroid	574	0.7	5.1	1889	2.3	11.8 *	2463	1.5	10.2 *
Urinary Bladder⁴	6310	7.5	-1.2	2448	2.9	-1.4	8760	5.2	-1.1
Other Sites	5441	6.4	-0.3	6149	7.4	-1.2	11591	6.9	-0.9

¹ Estimated Annual Percent Change

² Totals also include persons classified as transsexuals or hermaphrodites, and persons of unknown sex.

³ Massachusetts rates for this site include codes 64.9 & 65.9 (ICD-O-3) only for comparability. Massachusetts hospital coding conventions may have assigned some cases to a "not otherwise specified" category.

⁴ Massachusetts rates include invasive and *in situ* bladder cancer. * EAPC is statistically significant (p<0.05).

Table 4.
AGE-ADJUSTED¹ INCIDENCE RATES² FOR SELECTED CANCER SITES BY SEX
Massachusetts Residents, 1997-2001³ and 12 SEER Areas, 1996-2000⁴

Cancer Site / Type	M a l e s		F e m a l e s		T o t a l	
	Massachusetts	SEER	Massachusetts	SEER	Massachusetts	SEER
All Sites	614.2	555.8	455.0	417.9	517.1	472.3
Brain & Other Nervous System	9.1	7.7	6.4	5.3	7.6	6.4
Breast	1.3	1.2	145.6	135.0	80.7	73.9
Bronchus & Lung	91.6	80.8	60.4	49.6	72.9	62.6
Cervix Uteri	---	---	7.6	9.6	---	---
Colon / Rectum	73.0	64.2	51.8	46.7	60.6	54.2
Corpus Uteri & Uterus, NOS	---	---	27.6	24.1	---	---
Esophagus	10.6	7.7	2.5	2.1	6.0	4.5
Hodgkin's Disease (Hodgkin Lymphoma)	3.7	3.0	3.1	2.4	3.4	2.7
Kidney & Renal Pelvis⁵	17.8	15.4	8.9	7.7	12.7	11.1
Larynx	8.7	7.0	1.8	1.5	4.8	3.9
Leukemia	14.2	15.8	9.0	9.3	11.2	12.1
Liver & Intrahepatic Bile Ducts	7.9	9.0	2.4	3.4	4.9	5.9
Melanoma of Skin	21.7	21.0	14.3	13.5	17.3	16.6
Multiple Myeloma	6.1	7.0	4.0	4.6	4.9	5.6
Non-Hodgkin('s) Lymphoma	23.1	23.5	16.3	15.6	19.2	19.1
Oral Cavity & Pharynx	17.0	16.3	6.9	6.5	11.4	10.9
Ovary	---	---	14.5	16.8	---	---
Pancreas	13.4	12.6	10.4	9.8	11.7	11.1
Prostate	185.4	170.1	---	---	---	---
Stomach	12.9	13.0	5.5	6.2	8.6	9.1
Testis	5.9	5.2	---	---	---	---
Thyroid	3.8	3.6	11.2	9.9	7.6	6.8
Urinary Bladder	47.1	36.0	12.7	9.1	26.6	20.3

¹ age-adjusted to the 2000 U.S. Standard Population

² per 100,000

³ ICD-O-3 codes

⁴ ICD-O-2 codes

⁵ Massachusetts rates for this site include codes 64.9 & 65.9 (ICD-O-3) only for comparability. Massachusetts hospital coding conventions may have assigned some cases to a "not otherwise specified" category.

Table 5.
CANCER INCIDENCE BY SEX AND RACE/ETHNICITY¹
Massachusetts, 1997-2001

Cancer Site / Type	White, non-Hispanic			Black, non-Hispanic			Asian, non-Hispanic			Hispanic		
	Males	Females	Total²	Males	Females	Total²	Males	Females	Total²	Males	Females	Total²
All Sites	77008	76785	153808	3103	2348	5451	923	898	1822	1834	1734	3568
Brain & Other Nervous System	1188	1032	2220	24	23	47	18	10	28	46	43	89
Breast	153	23859	24015	10	685	695	2	242	244	2	496	498
Bronchus & Lung	11623	10532	22157	429	291	720	129	83	212	191	110	301
Cervix Uteri	0	1025	1025	0	91	91	0	40	40	0	106	106
Colon / Rectum	9099	9529	18630	286	274	560	116	109	225	163	163	326
Corpus Uteri & Uterus, NOS	0	4480	4481	0	123	123	0	45	45	0	118	118
Esophagus	1334	431	1766	66	25	91	10	3	13	33	18	51
Hodgkin's Disease (Hodgkin Lymphoma)	500	470	970	19	16	35	6	7	13	29	23	52
Kidney & Renal Pelvis³	2266	1505	3771	82	56	138	25	5	30	55	36	91
Larynx	1084	298	1382	55	14	69	10	1	11	42	8	50
Leukemia	1782	1513	3295	53	51	104	22	27	49	63	48	111
Liver & Intrahepatic Bile Ducts	879	381	1260	57	22	79	92	26	118	60	24	84
Melanoma of Skin	2895	2348	5244	6	10	16	8	4	12	21	20	41
Multiple Myeloma	747	678	1425	50	48	98	2	8	10	18	15	33
Non-Hodgkin('s) Lymphoma	2911	2775	5686	97	97	194	49	37	87	96	84	180
Oral Cavity & Pharynx	2122	1141	3263	85	47	132	51	30	81	92	21	113
Ovary	0	2401	2401	0	39	39	0	39	39	0	51	51
Pancreas	1635	1914	3549	79	67	146	13	16	29	45	33	78
Prostate	22960	0	22961	1303	0	1303	186	0	186	536	0	536
Stomach	1498	974	2472	89	49	138	53	31	84	62	38	100
Testis	888	0	889	11	0	11	8	0	8	37	0	37
Thyroid	512	1621	2133	13	59	72	17	64	81	13	69	82
Urinary Bladder⁴	6020	2312	8334	85	47	132	38	14	52	77	35	112
Other Sites	4912	5566	10479	204	214	418	68	57	125	153	175	328

¹ Race/ethnicity categories are mutually exclusive. Cases are only included in one race/ethnicity category.

² Totals also include persons classified as transsexuals or hermaphrodites, and persons of unknown sex.

³ Massachusetts rates for this site include codes 64.9 & 65.9 (ICD-O-3) only for comparability. Massachusetts hospital coding conventions may have assigned some cases to a "not otherwise specified" category.

⁴ Massachusetts rates include invasive and *in situ* bladder cancer.

Table 6.
AGE-ADJUSTED¹ INCIDENCE RATES² FOR SELECTED CANCER SITES BY SEX AND RACE/ETHNICITY³
Massachusetts, 1997-2001

Cancer Site / Type	White, non-Hispanic			Black, non-Hispanic			Asian, non-Hispanic			Hispanic		
	Males	Females	Total	Males	Females	Total	Males	Females	Total	Males	Females	Total
All Sites	605.5	455.2	513.1	726.8	384.9	522.9	348.5	263.2	300.0	492.4	326.6	394.7
Brain & Other Nervous System	9.2	6.5	7.7	4.4	3.1	3.5	*	2.0	3.2	7.5	5.3	6.3
Breast	1.2	147.4	81.5	*	108.9	62.0	*	64.6	34.3	*	92.1	51.5
Bronchus & Lung	91.5	61.4	73.3	103.5	50.3	72.2	53.5	29.1	40.2	58.7	24.6	38.9
Cervix Uteri	---	6.7	---	---	13.6	---	---	10.4	---	---	16.9	---
Colon / Rectum	72.7	51.5	60.3	71.6	47.8	57.2	45.7	40.0	43.1	47.9	35.7	40.6
Corpus Uteri & Uterus, NOS	---	27.7	---	---	20.8	---	---	12.1	---	---	22.8	---
Esophagus	10.5	2.3	5.9	15.8	4.3	9.1	*	*	*	10.1	*	7.0
Hodgkin's Disease (Hodgkin Lymphoma)	3.7	3.2	3.5	*	*	2.3	*	*	*	3.8	2.5	3.1
Kidney & Renal Pelvis⁴	17.7	8.9	12.7	17.5	8.9	12.5	8.5	*	4.7	13.4	6.9	9.8
Larynx	8.4	1.8	4.7	12.4	*	6.5	*	*	*	11.4	*	5.7
Leukemia	14.2	9.0	11.1	9.9	7.6	8.5	6.4	6.7	6.6	11.7	7.1	9.1
Liver & Intrahepatic Bile Ducts	6.9	2.1	4.2	11.4	3.7	7.3	28.6	9.4	18.7	14.9	5.5	9.7
Melanoma of Skin	22.4	14.8	17.9	*	*	*	*	*	*	5.7	3.2	4.2
Multiple Myeloma	5.9	3.8	4.7	12.1	8.6	10.2	*	*	*	*	*	4.1
Non-Hodgkin('s) Lymphoma	22.8	16.1	18.9	17.6	15.2	16.5	17.6	10.3	13.6	19.3	15.0	17.0
Oral Cavity & Pharynx	16.5	6.8	11.1	18.8	7.5	12.2	13.8	8.9	11.4	23.4	4.3	12.7
Ovary	---	14.7	---	---	6.5	---	---	9.9	---	---	9.1	---
Pancreas	13.0	10.3	11.5	18.3	11.8	14.6	*	*	5.5	13.5	7.4	10.0
Prostate	178.9	---	---	316.8	---	---	80.8	---	---	166.1	---	---
Stomach	12.1	5.1	8.0	22.4	8.8	14.2	21.1	10.1	15.1	18.0	8.0	12.3
Testis	6.4	---	---	*	---	---	*	---	---	3.2	---	---
Thyroid	3.8	11.0	7.5	*	8.0	5.3	*	13.9	9.3	*	9.0	5.8
Urinary Bladder⁵	48.2	13.0	27.2	22.3	8.5	14.0	16.9	*	10.5	25.6	8.0	15.2

¹ age-adjusted to the 2000 U.S. Standard Population

² per 100,000 ³ Race/ethnicity categories are mutually exclusive. Cases are only included in one race/ethnicity category.

⁴ Massachusetts rates for this site include codes 64.9 & 65.9 (ICD-O-3) only for comparability. Massachusetts hospital coding conventions may have assigned some cases to a "not otherwise specified" category. ⁵ Massachusetts rates include invasive and *in situ* bladder cancer.

* age-adjusted incidence rate not calculated when number of cases < 20

Table 7.
ANNUAL AGE-ADJUSTED¹ INCIDENCE RATES² FOR SELECTED CANCER SITES
Massachusetts, 1997-2001
MALES

Cancer Site / Type	1997	1998	1999	2000	2001
All Sites	619.0	621.6	603.8	611.4	615.8
Brain & Other Nervous System	9.7	9.2	8.3	9.6	8.5
Breast	1.1	1.4	1.5	1.4	0.9
Bronchus & Lung	95.1	97.7	90.7	87.4	87.3
Colon / Rectum	75.3	76.7	70.8	68.8	73.4
Esophagus	10.0	10.1	11.2	11.3	10.5
Hodgkin's Disease (Hodgkin Lymphoma)	3.2	4.3	3.9	3.3	3.7
Kidney & Renal Pelvis³	17.4	17.2	18.2	17.4	18.6
Larynx	10.1	9.0	8.9	8.7	6.9
Leukemia	14.7	14.6	14.5	14.0	13.2
Liver & Intrahepatic Bile Ducts	7.4	7.9	7.0	8.7	8.7
Melanoma of Skin	19.4	20.3	20.2	21.2	27.4
Multiple Myeloma	5.7	5.8	5.6	6.3	7.2
Non-Hodgkin('s) Lymphoma	23.6	22.8	23.3	22.2	23.5
Oral Cavity & Pharynx	17.3	18.5	16.6	17.4	15.3
Pancreas	14.3	13.9	13.8	12.6	12.4
Prostate	183.6	180.3	183.9	190.8	188.3
Stomach	13.5	12.7	12.3	13.7	12.4
Testis	4.8	6.4	6.3	6.2	5.9
Thyroid	3.2	3.9	3.8	4.0	4.1
Urinary Bladder⁴	48.7	48.0	44.9	48.1	45.8

¹ age-adjusted to the 2000 U.S. Standard Population

² per 100,000 males

³ Massachusetts rates for this site include codes 64.9 & 65.9 (ICD-O-3) only for comparability. Massachusetts hospital coding conventions may have assigned some cases to a "not otherwise specified" category. ⁴ Massachusetts rates include invasive and in situ bladder cancer.

Table 7. (continued)
ANNUAL AGE-ADJUSTED¹ INCIDENCE RATES² FOR SELECTED CANCER SITES
Massachusetts, 1997-2001
FEMALES

Cancer Site / Type	1997	1998	1999	2000	2001
All Sites	454.4	463.4	454.2	450.5	452.6
Brain & Other Nervous System	6.8	6.0	6.6	6.8	5.9
Breast	144.5	154.2	145.5	144.2	139.8
Bronchus & Lung	60.1	60.0	60.4	60.7	60.7
Cervix Uteri	9.7	8.0	6.9	7.1	6.4
Colon / Rectum	53.9	51.3	51.4	49.4	53.0
Corpus Uteri & Uterus, NOS	27.0	29.3	28.9	26.1	26.9
Esophagus	2.6	2.8	2.2	2.3	2.6
Hodgkin's Disease (Hodgkin Lymphoma)	3.0	3.3	3.2	3.2	2.7
Kidney & Renal Pelvis³	7.2	9.5	9.7	8.5	9.6
Larynx	1.9	1.8	1.8	1.9	1.7
Leukemia	8.0	9.1	9.8	9.6	8.5
Liver & Intrahepatic Bile Ducts	2.1	2.4	2.6	2.5	2.3
Melanoma of Skin	12.9	12.3	13.9	14.6	17.8
Multiple Myeloma	4.3	4.2	3.8	4.0	3.8
Non-Hodgkin('s) Lymphoma	17.2	16.3	17.1	14.7	16.3
Oral Cavity & Pharynx	7.3	6.7	7.6	6.4	6.7
Ovary	14.3	14.7	13.5	14.9	15.2
Pancreas	10.3	10.4	10.4	10.6	10.4
Stomach	6.3	5.8	4.8	5.4	5.3
Thyroid	8.5	10.3	10.6	13.2	13.1
Urinary Bladder⁴	12.6	14.1	12.3	12.2	12.5

¹ age-adjusted to the 2000 U.S. Standard Population

² per 100,000 females

³ Massachusetts rates for this site include codes 64.9 & 65.9 (ICD-O-3) only for comparability. Massachusetts hospital coding conventions may have assigned some cases to a "not otherwise specified" category. ⁴ Massachusetts rates include invasive and *in situ* bladder cancer.

Table 7. (continued)
ANNUAL AGE-ADJUSTED¹ INCIDENCE RATES² FOR SELECTED CANCER SITES
Massachusetts, 1997-2001
TOTAL

Cancer Site / Type	1997	1998	1999	2000	2001
All Sites	517.5	524.4	512.5	514.0	517.1
Brain & Other Nervous System	8.0	7.5	7.4	8.1	7.0
Breast	80.5	85.4	80.8	79.7	76.9
Bronchus & Lung	74.1	74.9	72.8	71.3	71.4
Cervix Uteri	9.7	8.0	6.9	7.1	6.4
Colon / Rectum	62.5	62.0	59.5	57.5	61.5
Corpus Uteri & Uterus, NOS	27.0	29.3	28.9	26.1	26.9
Esophagus	5.7	6.0	6.1	6.2	6.0
Hodgkin's Disease (Hodgkin Lymphoma)	3.1	3.7	3.5	3.3	3.2
Kidney & Renal Pelvis³	11.6	12.8	13.4	12.3	13.7
Larynx	5.5	4.9	4.9	4.8	3.9
Leukemia	10.7	11.3	11.8	11.5	10.5
Liver & Intrahepatic Bile Ducts	4.4	4.8	4.6	5.3	5.2
Melanoma of Skin	15.5	15.6	16.5	17.2	21.6
Multiple Myeloma	4.8	4.8	4.6	4.9	5.1
Non-Hodgkin('s) Lymphoma	20.0	19.0	19.8	17.9	19.4
Oral Cavity & Pharynx	11.6	12.0	11.6	11.3	10.5
Ovary	14.3	14.7	13.5	14.9	15.2
Pancreas	12.0	11.9	11.8	11.6	11.3
Prostate	183.6	180.3	183.9	190.8	188.3
Stomach	9.3	8.6	7.8	8.8	8.3
Testis	4.8	6.4	6.3	6.2	5.9
Thyroid	5.9	7.2	7.3	8.8	8.8
Urinary Bladder⁴	27.1	27.7	25.5	26.9	26.0

¹ age-adjusted to the 2000 U.S. Standard Population

² per 100,000 residents, except for single-sex sites -- per 100,000 females for Cervix Uteri; Corpus Uteri & Uterus, NOS; and Ovary; per 100,000 males for Prostate

and Testis ³ Massachusetts rates for this site include codes 64.9 & 65.9 (ICD-O-3) only for comparability. Massachusetts hospital coding conventions may have

assigned some cases to a "not otherwise specified" category. ⁴ Massachusetts rates include invasive and *in situ* bladder cancer.

Table 8.
AGE-SPECIFIC INCIDENCE RATES¹ FOR SELECTED CANCER SITES BY SEX
Massachusetts, 1997-2001

<u>Cancer Site / Type</u>	<u>Age Group</u>	<u>Males</u>	<u>Females</u>	<u>Total</u>
All Sites	0-19	17.1	16.3	16.7
	20-44	82.8	137.6	110.5
	45-64	806.7	750.3	777.5
	65-74	2874.1	1650.2	2192.3
	75-84	3470.9	2081.3	2604.9
	85+	3185.9	1908.8	2244.4
Brain & Other Nervous System	0-19	3.4	3.0	3.2
	20-44	4.1	3.4	3.7
	45-64	12.7	8.5	10.5
	65-74	28.4	17.3	22.2
	75-84	32.8	22.2	26.2
	85+	23.3	16.9	18.6
Breast	0-19	0.0	0.0	0.0
	20-44	0.2	51.8	26.3
	45-64	1.7	300.1	156.0
	65-74	5.5	466.6	262.4
	75-84	7.5	497.3	312.8
	85+	5.2	390.4	289.2
Bronchus & Lung	0-19	0.0	0.0	0.0
	20-44	5.2	4.9	5.1
	45-64	109.1	92.7	100.6
	65-74	474.2	301.5	378.0
	75-84	594.9	332.4	431.3
	85+	428.3	190.1	252.7
Cervix Uteri	0-19	----	0.1	----
	20-44	----	8.4	----
	45-64	----	12.4	----
	65-74	----	13.7	----
	75-84	----	13.8	----
	85+	----	11.1	----
Colon / Rectum	0-19	0.1	0.0	0.1
	20-44	5.8	5.3	5.5
	45-64	79.1	58.3	68.4
	65-74	329.8	206.3	261.0
	75-84	496.3	373.1	419.5
	85+	558.5	421.8	457.7

¹ per 100,000

Table 8. (continued)
AGE-SPECIFIC INCIDENCE RATES¹ FOR SELECTED CANCER SITES BY SEX
Massachusetts, 1997-2001

<u>Cancer Site / Type</u>	<u>Age Group</u>	<u>Males</u>	<u>Females</u>	<u>Total</u>
Corpus Uteri & Uterus, NOS	0-19	----	0.0	----
	20-44	----	5.1	----
	45-64	----	61.7	----
	65-74	----	103.4	----
	75-84	----	91.2	----
	85+	----	61.0	----
Esophagus	0-19	0.0	0.0	0.0
	20-44	0.7	0.2	0.4
	45-64	16.3	2.9	9.4
	65-74	49.9	10.8	28.1
	75-84	56.1	17.2	31.8
	85+	54.4	19.4	28.6
Hodgkin's Disease (Hodgkin Lymphoma)	0-19	1.3	1.6	1.5
	20-44	5.0	4.3	4.7
	45-64	3.9	2.3	3.1
	65-74	5.4	5.1	5.2
	75-84	4.5	4.2	4.3
	85+	3.2	2.8	2.9
Kidney & Renal Pelvis	0-19	0.7	0.6	0.7
	20-44	3.2	2.0	2.6
	45-64	29.2	14.0	21.3
	65-74	70.9	39.3	53.3
	75-84	89.9	39.4	58.4
	85+	64.8	31.9	40.5
Larynx	0-19	0.0	0.0	0.0
	20-44	0.8	0.2	0.5
	45-64	15.3	3.6	9.3
	65-74	39.8	9.3	22.8
	75-84	41.3	6.5	19.6
	85+	27.2	2.8	9.2
Leukemia	0-19	4.0	3.9	4.0
	20-44	3.6	2.6	3.1
	45-64	15.4	10.9	13.1
	65-74	47.9	28.3	37.0
	75-84	83.8	40.1	56.6
	85+	82.3	56.8	63.5

Table 8. (continued)
AGE-SPECIFIC INCIDENCE RATES¹ FOR SELECTED CANCER SITES BY SEX
Massachusetts, 1997-2001

<u>Cancer Site / Type</u>	<u>Age Group</u>	<u>Males</u>	<u>Females</u>	<u>Total</u>
Liver & Intrahepatic Bile Ducts	0-19	0.3	0.1	0.2
	20-44	1.2	0.3	0.7
	45-64	13.5	3.0	8.1
	65-74	32.7	9.4	19.7
	75-84	39.9	15.5	24.7
	85+	27.2	16.2	19.1
Melanoma of Skin	0-19	0.4	0.5	0.4
	20-44	8.3	11.0	9.7
	45-64	34.4	24.4	29.2
	65-74	73.7	35.1	52.2
	75-84	100.5	40.4	63.1
	85+	92.0	37.9	52.1
Multiple Myeloma	0-19	0.0	0.0	0.0
	20-44	0.5	0.4	0.4
	45-64	7.8	5.6	6.7
	65-74	26.3	18.4	21.9
	75-84	38.7	24.0	29.5
	85+	42.8	22.2	27.6
Non-Hodgkin('s) Lymphoma	0-19	1.5	1.2	1.3
	20-44	7.5	5.5	6.5
	45-64	30.8	20.5	25.5
	65-74	80.9	64.8	71.9
	75-84	126.3	89.5	103.4
	85+	125.1	71.6	85.7
Oral Cavity & Pharynx	0-19	0.3	0.2	0.3
	20-44	3.3	2.0	2.6
	45-64	33.5	12.0	22.4
	65-74	64.5	26.3	43.2
	75-84	63.1	28.3	41.4
	85+	66.1	29.1	38.8
Ovary	0-19	----	0.5	----
	20-44	----	5.0	----
	45-64	----	27.8	----
	65-74	----	47.5	----
	75-84	----	55.9	----
	85+	----	44.1	----

Table 8. (continued)
AGE-SPECIFIC INCIDENCE RATES¹ FOR SELECTED CANCER SITES BY SEX
Massachusetts, 1997-2001

<u>Cancer Site / Type</u>	<u>Age Group</u>	<u>Males</u>	<u>Females</u>	<u>Total</u>
Pancreas	0-19	0.0	0.0	0.0
	20-44	1.1	0.7	0.9
	45-64	16.9	10.7	13.7
	65-74	57.4	48.3	52.3
	75-84	84.3	72.6	77.0
	85+	99.1	85.5	89.1
Prostate	0-19	0.0	----	----
	20-44	2.0	----	----
	45-64	271.5	----	----
	65-74	1068.7	----	----
	75-84	925.7	----	----
	85+	679.0	----	----
Stomach	0-19	0.0	0.0	0.0
	20-44	1.3	0.9	1.1
	45-64	14.6	5.5	9.9
	65-74	52.3	21.7	35.2
	75-84	85.0	36.2	54.6
	85+	116.0	59.4	74.2
Testis	0-19	1.0	----	----
	20-44	12.9	----	----
	45-64	3.8	----	----
	65-74	1.6	----	----
	75-84	1.6	----	----
	85+	0.6	----	----
Thyroid	0-19	0.3	0.8	0.5
	20-44	3.6	15.4	9.6
	45-64	6.4	17.2	12.0
	65-74	9.8	13.1	11.6
	75-84	5.9	11.4	9.3
	85+	3.9	7.4	6.5
Urinary Bladder²	0-19	0.0	0.0	0.0
	20-44	3.2	1.3	2.2
	45-64	48.4	16.5	31.9
	65-74	212.1	56.9	125.6
	75-84	336.0	77.8	175.1
	85+	367.4	82.7	157.5

¹ per 100,000 ² Massachusetts rates include include *in situ* and invasive bladder cancer

Table 9.
CANCER MORTALITY AND MORTALITY TRENDS BY SEX

Massachusetts, 1997-2001									
<i>Cancer Site / Type</i>	<i>M a l e s</i>			<i>F e m a l e s</i>			<i>T o t a l</i>		
	<i>Number</i>	<i>Percent</i>	<i>EAPC¹</i>	<i>Number</i>	<i>Percent</i>	<i>EAPC¹</i>	<i>Number</i>	<i>Percent</i>	<i>EAPC¹</i>
All Sites	34478	100.0	-0.5	34766	100.0	-0.4	69244	100.0	-0.4
Brain & Other Nervous System	802	2.3	0.1	657	1.9	-4.2	1459	2.1	-1.7
Breast	36	0.1	-5.7	5371	15.4	-3.4 *	5407	7.8	-3.4 *
Bronchus & Lung	9951	28.9	-2.4 *	8412	24.2	0.0	18363	26.5	-1.1
Cervix Uteri	0	0.0	---	367	1.1	-9.7	367	0.5	---
Colon / Rectum	3708	10.8	-2.3	4009	11.5	-3.7 *	7717	11.1	-2.9 *
Corpus Uteri & Uterus, NOS	0	0.0	---	813	2.3	2.4	813	1.2	---
Esophagus	1287	3.7	0.9	403	1.2	-4.1	1690	2.4	-0.6
Hodgkin's Disease (Hodgkin Lymphoma)	82	0.2	6.0	94	0.3	0.0	176	0.3	2.2
Kidney & Renal Pelvis	824	2.4	-1.1	526	1.5	1.3	1350	1.9	0.2
Larynx	390	1.1	0.0	105	0.3	-4.6	495	0.7	-1.4 *
Leukemia	1388	4.0	7.5	1224	3.5	7.3	2612	3.8	7.1
Liver & Intrahepatic Bile Ducts	986	2.9	1.8	512	1.5	-2.6	1498	2.2	0.3
Melanoma of Skin	614	1.8	-1.7	399	1.1	-1.9	1013	1.5	-1.5
Multiple Myeloma	575	1.7	-0.8	594	1.7	1.0	1169	1.7	-0.1
Non-Hodgkin('s) Lymphoma	1390	4.0	-5.7	1470	4.2	-3.6	2860	4.1	-4.5
Oral Cavity & Pharynx	588	1.7	-2.7	339	1.0	2.1	927	1.3	-1.4
Ovary	0	0.0	---	1665	4.8	1.6	1665	2.4	---
Pancreas	1701	4.9	-0.7	2061	5.9	0.7	3762	5.4	0.3
Prostate	3859	11.2	-2.2	0	0.0	---	3859	5.6	---
Stomach	1025	3.0	-1.6	757	2.2	-3.5	1782	2.6	-2.4
Testis	44	0.1	-16.1	0	0.0	---	44	0.1	---
Thyroid	68	0.2	4.1	91	0.3	-2.7	159	0.2	-0.9
Urinary Bladder	1151	3.3	0.3	584	1.7	0.1	1735	2.5	0.5
Other Sites	4009	11.6	-0.4	4313	12.4	-0.1	8322	12.0	-0.2

¹ Estimated Annual Percent Change

* EAPC is statistically significant (p<0.05).

Table 10.
AGE-ADJUSTED¹ MORTALITY RATES² FOR SELECTED CANCER SITES BY SEX
Massachusetts, 1997-2001, and United States, 1996-2000

Cancer Site / Type	M a l e s		F e m a l e s		T o t a l	
	Massachusetts	U.S.	Massachusetts	U.S.	Massachusetts	U.S.
All Sites	263.9	255.5	177.3	168.3	209.6	202.3
Brain & Other Nervous System	5.7	5.7	3.6	3.8	4.5	4.7
Breast	0.3	0.3	28.1	27.7	16.3	15.8
Bronchus & Lung	74.1	79.5	44.1	40.7	55.9	56.8
Cervix Uteri	---	---	2.0	3.0	---	---
Colon / Rectum	28.6	25.8	19.0	18.0	22.8	21.2
Corpus Uteri & Uterus, NOS	---	---	4.1	4.1	---	---
Esophagus	9.5	7.6	2.0	1.8	5.2	4.3
Hodgkin's Disease (Hodgkin Lymphoma)	0.6	0.6	0.5	0.4	0.5	0.5
Kidney & Renal Pelvis	6.2	6.1	2.6	2.8	4.1	4.2
Larynx	2.9	2.6	0.6	0.5	1.5	1.4
Leukemia	10.6	10.3	6.0	5.9	7.8	7.7
Liver & Intrahepatic Bile Ducts	7.2	6.6	2.5	2.9	4.6	4.5
Melanoma of Skin	4.5	3.9	2.1	1.8	3.1	2.7
Multiple Myeloma	4.4	4.8	3.0	3.2	3.5	3.9
Non-Hodgkin('s) Lymphoma	10.4	10.7	7.2	7.0	8.6	8.6
Oral Cavity & Pharynx	4.3	4.4	1.7	1.7	2.8	2.9
Ovary	---	---	8.8	8.8	---	---
Pancreas	12.7	12.2	10.1	9.2	11.3	10.5
Prostate	31.9	32.9	---	---	---	---
Stomach	7.9	6.9	3.6	3.4	5.3	4.8
Testis	0.3	0.3	---	---	---	---
Thyroid	0.5	0.4	0.4	0.5	0.5	0.5
Urinary Bladder	9.2	7.7	2.7	2.3	5.1	4.4

¹ age-adjusted to the 2000 U.S. Standard Population

² per 100,000

Table 11.
CANCER MORTALITY BY SEX AND RACE/ETHNICITY¹
Massachusetts, 1997-2001

Cancer Site / Type	White, non-Hispanic			Black, non-Hispanic			Asian, non-Hispanic			Hispanic		
	Males	Females	Total	Males	Females	Total	Males	Females	Total	Males	Females	Total
All Sites	32273	32834	65107	1357	1161	2518	338	326	664	483	405	888
Brain & Other Nervous System	765	638	1403	13	9	22	8	3	11	16	7	23
Breast	35	5057	5092	1	193	194	0	46	46	0	66	66
Bronchus & Lung	9371	8067	17438	390	226	616	85	61	146	100	49	149
Cervix Uteri	0	312	312	0	31	31	0	13	13	0	11	11
Colon / Rectum	3489	3786	7275	141	134	275	29	40	69	46	43	89
Corpus Uteri & Uterus, NOS	0	745	745	0	46	46	0	4	4	0	13	13
Esophagus	1200	371	1571	61	19	80	6	3	9	18	9	27
Hodgkin's Disease (Hodgkin Lymphoma)	72	91	163	6	0	6	1	0	1	3	3	6
Kidney & Renal Pelvis	787	503	1290	22	15	37	8	3	11	6	5	11
Larynx	353	94	447	26	10	36	2	1	3	8	0	8
Leukemia	1318	1157	2475	30	35	65	12	18	30	27	14	41
Liver & Intrahepatic Bile Ducts	839	451	1290	51	21	72	59	23	82	37	17	54
Melanoma of Skin	600	396	996	4	1	5	1	0	1	9	2	11
Multiple Myeloma	522	542	1064	41	39	80	0	2	2	11	11	22
Non-Hodgkin('s) Lymphoma	1333	1385	2718	20	43	63	17	16	33	17	25	42
Oral Cavity & Pharynx	536	321	857	26	8	34	9	4	13	14	5	19
Ovary	0	1606	1606	0	29	29	0	8	8	0	21	21
Pancreas	1584	1952	3536	79	75	154	17	13	30	21	19	40
Prostate	3592	0	3592	197	0	197	15	0	15	50	0	50
Stomach	916	680	1596	59	40	99	22	21	43	27	16	43
Testis	41	0	41	1	0	1	1	0	1	1	0	1
Thyroid	61	86	147	6	2	8	1	3	4	0	0	0
Urinary Bladder	1119	551	1670	23	25	48	3	2	5	5	5	10
Other Sites	3740	4043	7783	160	160	320	42	42	84	67	64	131

¹ Race/ethnicity categories are mutually exclusive. Deaths are only included in one race/ethnicity category.

Table 12.
AGE-ADJUSTED¹ MORTALITY RATES² FOR SELECTED CANCER SITES BY SEX AND RACE/ETHNICITY³
Massachusetts, 1997-2001

Cancer Site / Type	White, non-Hispanic			Black, non-Hispanic			Asian, non-Hispanic			Hispanic		
	Males	Females	Total	Males	Females	Total	Males	Females	Total	Males	Females	Total
All Sites	265.3	179.3	211.1	357.1	202.9	263.5	141.2	113.7	125.8	143.9	87.1	110.3
Brain & Other Nervous System	5.9	3.8	4.8	*	*	1.9	*	*	*	*	*	1.7
Breast	0.3	28.5	16.6	*	32.3	18.9	*	14.0	7.4	*	12.5	6.9
Bronchus & Lung	74.9	45.4	56.9	99.5	39.9	63.9	36.9	23.3	29.5	30.7	11.9	20.0
Cervix Uteri	---	1.9	---	---	5.1	---	---	*	---	---	*	---
Colon / Rectum	28.8	19.1	22.9	38.3	24.3	29.9	10.6	15.5	13.7	14.8	9.9	11.8
Corpus Uteri & Uterus, NOS	---	4.0	---	---	8.2	---	---	*	---	---	*	---
Esophagus	9.5	2.0	5.2	15.1	3.4	8.2	*	*	*	*	*	4.0
Hodgkin's Disease (Hodgkin Lymphoma)	0.6	0.6	0.6	*	*	*	*	*	*	*	*	*
Kidney & Renal Pelvis	6.3	2.7	4.2	5.7	*	3.9	*	*	*	*	*	*
Larynx	2.8	0.5	1.5	6.1	*	3.6	*	*	*	*	*	*
Leukemia	10.8	6.0	7.9	7.5	5.7	6.3	*	*	5.6	5.5	*	3.6
Liver & Intrahepatic Bile Ducts	6.6	2.3	4.2	11.5	3.9	7.2	19.9	8.2	13.8	10.2	*	6.9
Melanoma of Skin	4.8	2.3	3.3	*	*	*	*	*	*	*	*	*
Multiple Myeloma	4.3	2.9	3.4	10.7	7.0	8.5	*	*	*	*	*	3.2
Non-Hodgkin('s) Lymphoma	10.8	7.3	8.7	4.0	7.5	6.3	*	*	6.8	*	4.8	4.6
Oral Cavity & Pharynx	4.3	1.7	2.8	5.7	*	3.3	*	*	*	*	*	*
Ovary	---	9.1	---	---	5.2	---	---	*	---	---	4.5	---
Pancreas	12.7	10.2	11.3	19.5	13.4	16.0	*	*	5.7	6.0	*	5.3
Prostate	31.6	---	---	64.4	---	---	*	---	---	21.8	---	---
Stomach	7.6	3.4	5.1	15.1	7.3	10.6	11.5	7.2	9.0	7.9	*	5.0
Testis	0.3	---	---	*	---	---	*	---	---	*	---	---
Thyroid	0.5	0.4	0.5	*	*	*	*	*	*	*	*	*
Urinary Bladder	9.5	2.7	5.2	6.5	4.6	5.4	*	*	*	*	*	*

¹ age-adjusted to the 2000 U.S. Standard Population

² per 100,000

³ Race/ethnicity categories are mutually exclusive. Deaths are only included in one race/ethnicity category.

* age-adjusted mortality rate not calculated when number of deaths < 20

Table 13.
ANNUAL AGE-ADJUSTED¹ MORTALITY RATES² FOR SELECTED CANCER SITES
Massachusetts, 1997-2001
MALES

Cancer Site / Type	1997	1998	1999	2000	2001
All Sites	269.2	264.2	262.6	258.8	265.4
Brain & Other Nervous System	5.2	6.0	5.8	5.9	5.3
Breast	0.4	0.2	0.2	0.2	0.3
Bronchus & Lung	77.4	76.3	73.5	73.6	69.9
Colon / Rectum	29.1	30.5	27.8	28.7	26.8
Esophagus	9.0	9.5	9.9	9.8	9.2
Hodgkin's Disease (Hodgkin Lymphoma)	0.3	0.7	0.9	0.2	0.7
Kidney & Renal Pelvis	6.6	6.1	5.5	6.6	6.0
Larynx	2.8	3.0	3.0	2.7	3.0
Leukemia	9.6	9.5	10.2	10.1	13.4
Liver & Intrahepatic Bile Ducts	7.5	6.8	6.6	6.6	8.4
Melanoma of Skin	4.8	4.7	4.0	4.7	4.4
Multiple Myeloma	4.9	3.9	4.4	4.1	4.6
Non-Hodgkin('s) Lymphoma	11.2	11.8	10.7	8.8	9.7
Oral Cavity & Pharynx	4.5	4.4	4.5	4.0	4.1
Pancreas	12.8	12.8	12.6	12.9	12.3
Prostate	33.9	31.6	32.9	31.1	30.6
Stomach	8.2	8.1	7.1	8.8	7.2
Testis	0.4	0.2	0.4	0.3	0.1
Thyroid	0.6	0.3	0.5	0.4	0.7
Urinary Bladder	9.7	8.6	9.5	8.1	10.2

¹ age-adjusted to the 2000 U.S. Standard Population

² per 100,000 males

Table 13. (continued)
ANNUAL AGE-ADJUSTED¹ MORTALITY RATES² FOR SELECTED CANCER SITES
Massachusetts, 1997-2001
FEMALES

Cancer Site / Type	1997	1998	1999	2000	2001
All Sites	183.8	176.2	171.6	175.0	180.6
Brain & Other Nervous System	3.7	3.8	3.7	3.7	3.0
Breast	30.8	29.0	27.2	26.9	26.9
Bronchus & Lung	45.4	44.5	41.0	44.3	45.4
Cervix Uteri	2.3	2.6	1.8	2.0	1.6
Colon / Rectum	20.5	19.9	18.9	18.2	17.7
Corpus Uteri & Uterus, NOS	4.0	3.9	4.0	4.4	4.2
Esophagus	2.0	2.5	1.9	2.0	1.8
Hodgkin's Disease (Hodgkin Lymphoma)	0.6	0.4	0.6	0.4	0.6
Kidney & Renal Pelvis	2.5	2.5	3.1	2.4	2.8
Larynx	0.7	0.5	0.5	0.6	0.5
Leukemia	5.5	5.1	6.2	5.7	7.4
Liver & Intrahepatic Bile Ducts	3.0	2.3	2.3	2.0	2.8
Melanoma of Skin	2.4	2.0	1.8	2.5	1.9
Multiple Myeloma	2.8	3.1	2.9	2.9	3.1
Non-Hodgkin('s) Lymphoma	8.2	7.1	7.3	6.6	7.1
Oral Cavity & Pharynx	1.5	1.9	1.7	1.9	1.7
Ovary	9.1	7.9	8.7	9.1	9.1
Pancreas	9.9	10.2	9.9	10.6	10.1
Stomach	3.9	3.8	3.5	3.3	3.5
Thyroid	0.5	0.4	0.4	0.5	0.4
Urinary Bladder	3.0	2.4	2.6	2.8	2.8

¹ age-adjusted to the 2000 U.S. Standard Population

² per 100,000 females

Table 13. (continued)
ANNUAL AGE-ADJUSTED¹ MORTALITY RATES² FOR SELECTED CANCER SITES
Massachusetts, 1997-2001
TOTAL

Cancer Site / Type	1997	1998	1999	2000	2001
All Sites	214.9	208.4	205.6	206.3	211.5
Brain & Other Nervous System	4.3	4.8	4.7	4.7	4.0
Breast	17.9	16.8	15.8	15.7	15.6
Bronchus & Lung	57.7	56.9	54.0	56.0	54.9
Cervix Uteri	2.3	2.6	1.8	2.0	1.6
Colon / Rectum	24.0	23.9	22.6	22.3	21.4
Corpus Uteri & Uterus, NOS	4.0	3.9	4.0	4.4	4.2
Esophagus	4.9	5.5	5.3	5.3	4.9
Hodgkin's Disease (Hodgkin Lymphoma)	0.4	0.5	0.7	0.3	0.6
Kidney & Renal Pelvis	4.1	4.0	4.1	4.1	4.1
Larynx	1.6	1.6	1.5	1.5	1.5
Leukemia	7.1	6.8	7.8	7.5	9.6
Liver & Intrahepatic Bile Ducts	5.0	4.3	4.2	4.1	5.2
Melanoma of Skin	3.3	3.1	2.7	3.4	2.9
Multiple Myeloma	3.6	3.4	3.5	3.3	3.7
Non-Hodgkin('s) Lymphoma	9.4	9.0	8.8	7.5	8.2
Oral Cavity & Pharynx	2.8	3.0	2.9	2.8	2.7
Ovary	9.1	7.9	8.7	9.1	9.1
Pancreas	11.2	11.3	11.1	11.7	11.2
Prostate	33.9	31.6	32.9	31.1	30.6
Stomach	5.6	5.5	4.9	5.5	5
Testis	0.4	0.2	0.4	0.3	0.1
Thyroid	0.5	0.4	0.5	0.5	0.5
Urinary Bladder	5.5	4.7	5.0	4.8	5.5

¹ age-adjusted to the 2000 U.S. Standard Population

² per 100,000 residents, except for single-sex sites - per 100,000 females for Cervix Uteri; Corpus Uteri & Uterus; Ovary; per 100,000 males for Prostate; Testis

APPENDICES

APPENDIX I
ICD CODES USED FOR THIS REPORT

<i>Cancer Site / Type</i>	<i>..... C o d e s ICD-O-3* ICD-9** ICD-10***</i>		
Brain & Other Nervous System	C70.0 - C72.9 except 9590 - 9989	191 - 192	C70 - C72
Breast	C50.0 - C50.9 except 9590 - 9989	174 - 175	C50
Bronchus & Lung	C34.0 - C34.9 except 9590 - 9989	162.2 - 162.9	C34
Cervix Uteri	C53.0 - C53.9 except 9590 - 9989	180	C53
Colon/Rectum	C18.0 - C18.9, C19.9, C20.9, C26.0 except 9590 - 9989	153, 154.0 - 154.1, 159.0	C18 - C20, C26.0
Corpus Uteri & Uterus, NOS	C54.0 - C54.9, C55.9 except 9590 - 9989	179, 182	C54 - C55, D39.0
Esophagus	C15.0 - C15.9 except 9590 - 9989	150	C15
Hodgkin's Disease (Hodgkin Lymphoma)	C00.0 - C80.9 (includes 9650 - 9667)	201	C81
Kidney & Renal Pelvis	C64.9, C65.9 except 9590 - 9989	189.0 - 189.1	C64 - C65
Larynx	C32.0 - C32.9 except 9590 - 9989	161	C32
Leukemia	C00.0 - C80.9 (includes 9733, 9742, 9800 - 9820, 9826, 9831 - 9948, 9963- 9964) C42.0, C42.1, C42.4 (includes 9823, 9827)	202.4, 203.1, 204 - 208	C90.1, C91 - C95 D45, D46.0 - D46.4, D46.9, D47.1, D47.3

* *International Classification of Diseases for Oncology, 3d Ed. (2)* (includes codes added since publication) for incidence data

** *International Classification of Diseases, Ninth Revision (5)* (includes codes added since publication) for 1997-1998 mortality data

*** *International Classification of Diseases, Tenth Revision* (6) (includes codes added since publication) for 1999-2001 mortality data

Cancer Site / Type C o d e s		
	ICD-O-3*	ICD-9**	ICD-10***
Liver and Intra-hepatic Bile Ducts	C22.0, C22.1 except 9590 - 9989	155.0 - 155.2	C22
Melanoma of Skin	C44.0 - C44.9 (includes 8720 - 8790)	172	C43
Multiple Myeloma	C00.0 - C80.9 (includes 9731, 9732, 9734)	203.0, 238.6	C90.0, C90.2
Non-Hodgkin('s) Lymphoma	C00.0 - C80.9 (includes 9590 - 9596, 9670 - 9729) All sites except C42.0, C42.1, C42.4 (includes 9823, 9827)	200, 202.0 - 202.2, 202.8 - 202.9	C82 - C85, C96.3
Oral Cavity & Pharynx	C00.0 - C14.8 except 9590 - 9989	140 - 149	C00 - C14
Ovary	C56.9 except 9590 - 9989	183.0	C56
Pancreas	C25.0 - C25.9 except 9590 - 9989	157	C25
Prostate	C61.9 except 9590 - 9989	185	C61
Stomach	C16.0 - C16.9 except 9590 - 9989	151	C16
Testis	C62.0 - C62.9 except 9590 - 9989	186	<u>C62</u>
Thyroid	C73.9 except 9590 - 9989	193	C73
Urinary Bladder	C67.0 - C67.9 except 9590 - 9989	188	C67

* *International Classification of Diseases for Oncology, 3d Ed.* (2) (includes codes added since publication) for incidence data

** *International Classification of Diseases, Ninth Revision* (5) (includes codes added since publication) for 1997-1998 mortality data

*** *International Classification of Diseases, Tenth Revision* (6) (includes codes added since publication) for 1999-2001 mortality data

Appendix II
POPULATION ESTIMATES¹ BY AGE, RACE/ETHNICITY AND SEX
Massachusetts, 1997-2001

Age Group	White, non-Hispanic			Black, non-Hispanic			Asian, non-Hispanic			Hispanic		
	Males	Females	Total	Males	Females	Total	Males	Females	Total	Males	Females	Total
0-4	796,255	756,348	1,552,603	69,056	66,139	135,195	43,367	42,821	86,188	112,017	107,674	219,691
5-9	858,943	814,354	1,673,297	73,054	70,592	143,646	39,880	38,423	78,303	109,963	104,931	214,894
10-14	857,208	811,146	1,668,354	64,473	62,819	127,292	37,017	35,632	72,649	92,680	89,020	181,700
15-19	853,014	834,109	1,687,123	62,949	61,403	124,352	42,459	44,347	86,806	89,335	86,107	175,442
20-24	866,132	885,607	1,751,739	62,445	65,675	128,120	49,267	54,263	103,530	93,536	91,686	185,222
25-29	949,141	963,067	1,912,208	64,130	67,365	131,495	57,881	58,146	116,027	93,554	93,165	186,719
30-34	1,026,902	1,045,408	2,072,310	64,443	67,554	131,997	54,480	53,922	108,402	90,287	91,810	182,097
35-39	1,121,267	1,146,888	2,268,155	64,413	67,423	131,836	49,275	47,647	96,922	78,633	81,148	159,781
40-44	1,087,848	1,129,584	2,217,432	56,567	58,965	115,532	39,497	40,457	79,954	59,548	63,204	122,752
45-49	979,237	1,026,022	2,005,259	44,352	48,404	92,756	31,504	33,205	64,709	43,375	47,764	91,139
50-54	855,735	904,449	1,760,184	34,428	39,120	73,548	22,764	23,569	46,333	32,165	36,727	68,892
55-59	631,287	678,841	1,310,128	24,653	30,254	54,907	16,299	16,302	32,601	21,660	25,429	47,089
60-64	492,910	546,296	1,039,206	18,193	23,312	41,505	12,394	12,671	25,065	15,283	19,093	34,376
65-69	464,635	552,760	1,017,395	14,521	19,851	34,372	9,398	10,773	20,171	10,942	14,467	25,409
70-74	430,536	568,487	999,023	11,973	17,381	29,354	6,740	8,790	15,530	8,019	11,225	19,244
75-79	337,125	516,080	853,205	8,091	13,429	21,520	4,539	5,811	10,350	5,284	8,260	13,544
80-84	208,566	387,277	595,843	4,340	8,688	13,028	2,318	3,328	5,646	3,122	5,573	8,695
85+	145,837	415,431	561,268	3,385	8,197	11,582	1,736	3,043	4,779	3,188	5,838	9,026

¹ Source: Massachusetts Community Health Information Profile (MassCHIP). 1996-1998 data are annual estimates from the Massachusetts Institute for Social and Economic Research. 1999-2001 data are estimates from the Massachusetts Department of Public Health, Bureau of Health Statistics, Research and Evaluation, Division of Research and Epidemiology.

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